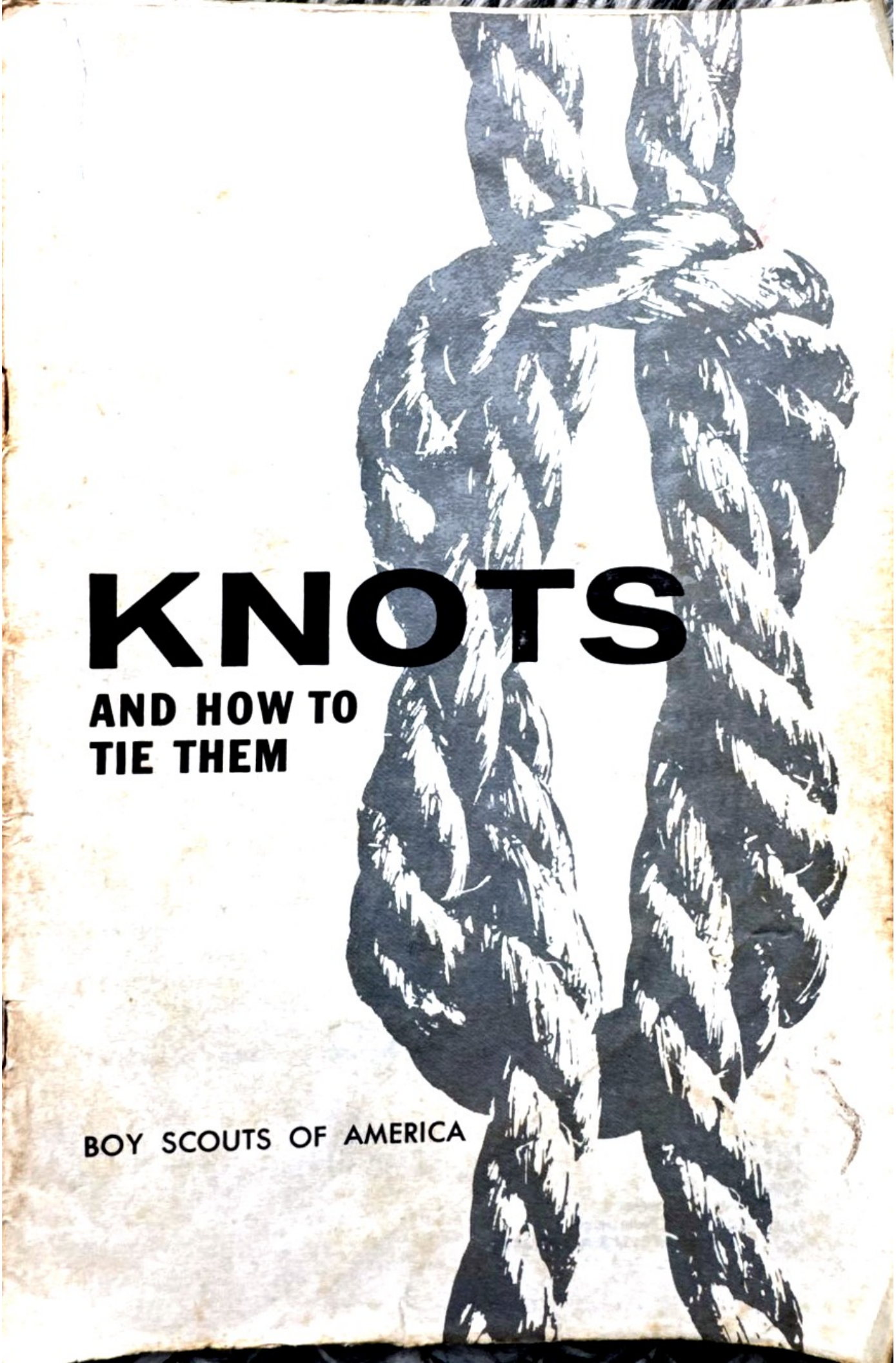
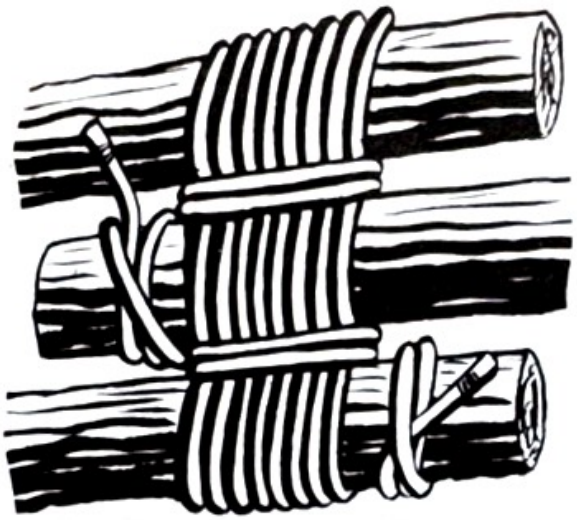


KNOTS

AND HOW TO TIE THEM

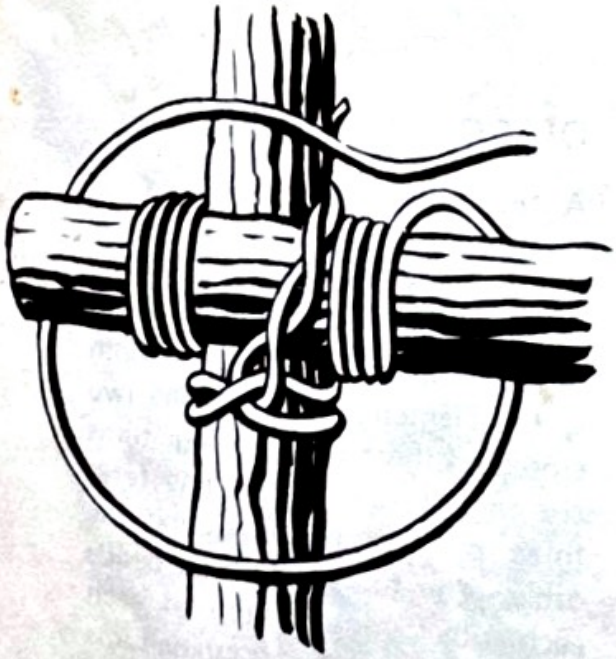
BOY SCOUTS OF AMERICA

TRIPOD LASHING



The method for forming a tripod is similar to shear lashing. Begin by laying the three spars on the ground pointing in alternate directions. Make a clove hitch or timber hitch around one of the outside spars. Now take seven or eight loose lashing turns around all three spars and two frapping turns in the spaces between. Finish with a clove hitch on the center spar as shown in the drawing and hoist the tripod into place.

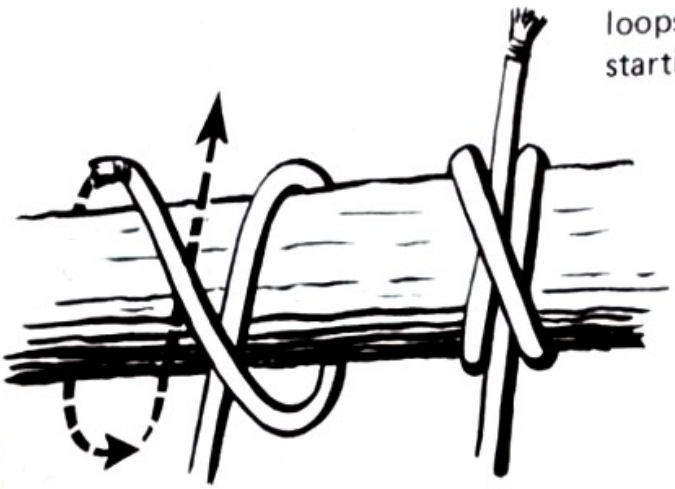
SQUARE LASHING

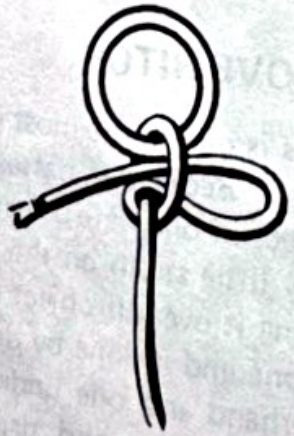


A square lashing is used whenever spars cross at an angle, touching each other where they cross. Start with a clove hitch around the upright, directly below where the crosspiece will be. After tightening it, twist the free rope end and the standing part around each other to hold the loose end. Now wrap the rope behind the upright, down in front of the crosspiece, and around behind the upright. Do this four times, keeping **outside** the previous turns on the crosspiece and **inside** them on the upright. Then make two or three frapping turns between the timbers and strain them tightly. The lashing is then finished with a clove hitch on the crosspiece. Make all turns as tight and secure as possible.

CLOVE HITCH OVER BAR

This is the same knot as the clove hitch, but this method of tying it must be used if the bar is closed at both ends or it's too high to toss loops over. This hitch is used in starting and finishing most lashings.





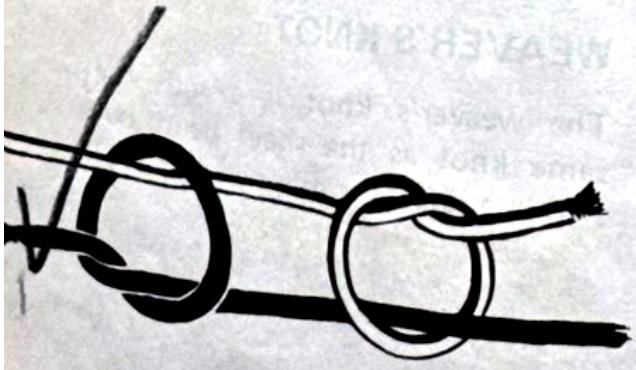
SLIPPERY HALF HITCH

This is occasionally useful but should be temporary. It is actually only an overhand knot around the object with the end run back through the knot and left "slippery." It can be quickly untied by pulling on the free end. The slippery half hitch can be locked by passing the end back through the eye and pulling tight.

SLIPPERY SHEET BEND

The slippery sheet bend is simply an ordinary sheet bend with a bight left in the smaller rope. This bight makes it "slippery" because it can be untied quickly, merely by a tug on the free end of the rope. It is a valuable knot for use when you expect to tie and untie it often.

FISHERMAN'S KNOT



The fisherman's knot is used for joining two fine lines such as fishing leaders. It is simply two overhand knots, one holding the right-hand line and the other the left-hand line. Pull each of the two overhand knots taut separately. Then make the whole knot taut so that the two overhand knots come together by pulling on the standing parts of each line.

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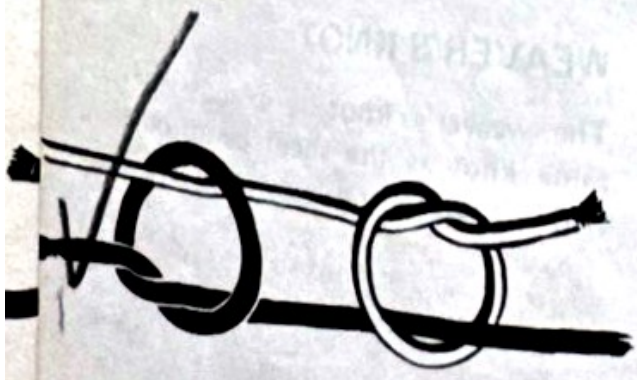

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THE DEVELOPMENT OF ROPE

Although we automatically associate knots with rope, thousands of years may have elapsed between the discovery of the elementary knots and the invention of rope. For a long while primitive man was satisfied with such crude but easily obtainable materials as vines, reeds, and leather thongs. Rope probably developed from the thongs. A single thong was found too weak for some purposes, and so two or three thongs had to be combined. To twist the leather strips into a solid rope was a short and natural step.

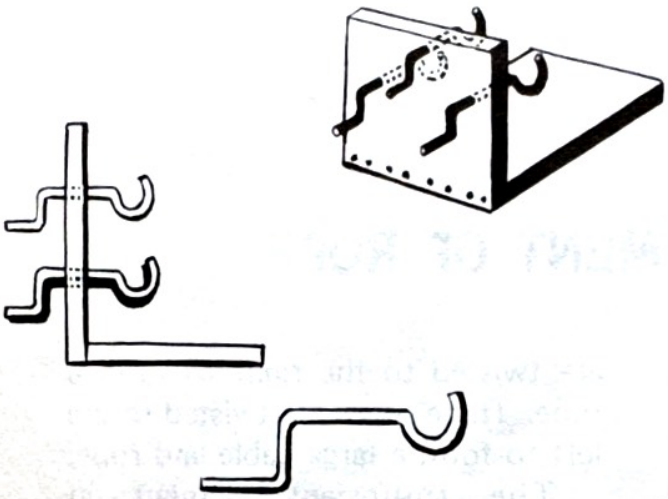
With the improvement in materials and methods came improvement in the technique of making rope; and the two present methods, twisting and braiding, slowly evolved. In a twisted rope a few fibers are twisted to the right to form a yarn, then a few yarns are twisted to the left to form a strand. Three (or sometimes four) strands are twisted to the right to form a rope. Three ropes are twisted to the left to form a large cable-laid rope.

The important element in twisted rope is the alternation of directions so that the fibers and strands pull against each other and overcome their natural tendency to untwist and fray. The friction of the alternately twisted parts makes a hard compact rope, capable of repelling water and standing tremendous strains.

The braided type of rope is usually woven by a special braiding machine in much the same manner as are heavy fabrics. When made this way good cotton rope, such as "spotted cord," is smooth, compact, and capable of giving long service before it becomes too soft. One way to test the quality of sash cord is to moisten it. The sizing in poor grades will quickly make it pasty and sticky. Braided rope is used extensively for rope spinning.

MAKING ROPE

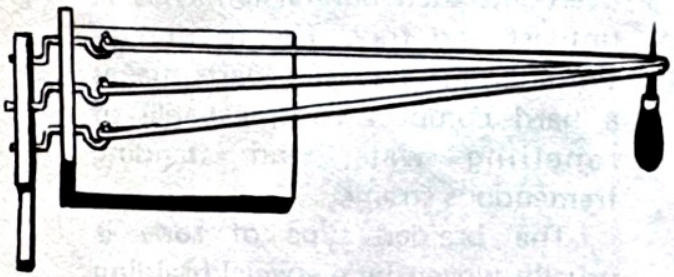
You can make your own rope if you put together the machine that is diagramed here.



Use half-inch wood for the parts. The hooks may be made of coat-hanger wire.

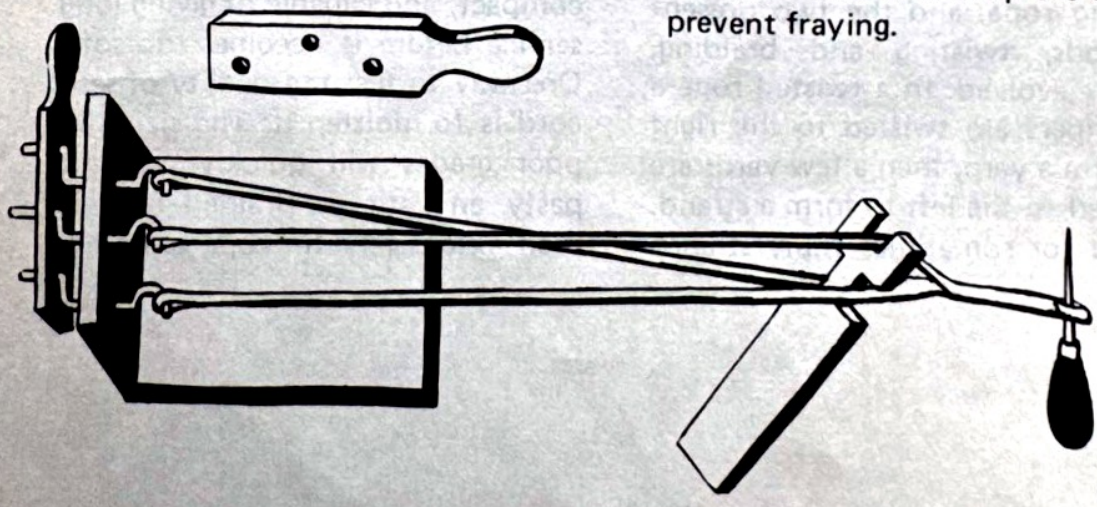
Use heavy string or twine. Tie the end of the twine to one of the hooks and loop it back and forth between the hooks and the awl. About three strands to each hook will make a medium-sized rope.

Insert the crank handle in the cranks and start rotating it. Hold the strands apart with the rope wrench until they get fairly tight. Then take hold of the strands behind the wrench—that is, on the side away from the machine—and begin twisting them slowly together as the wrench is moved forward.



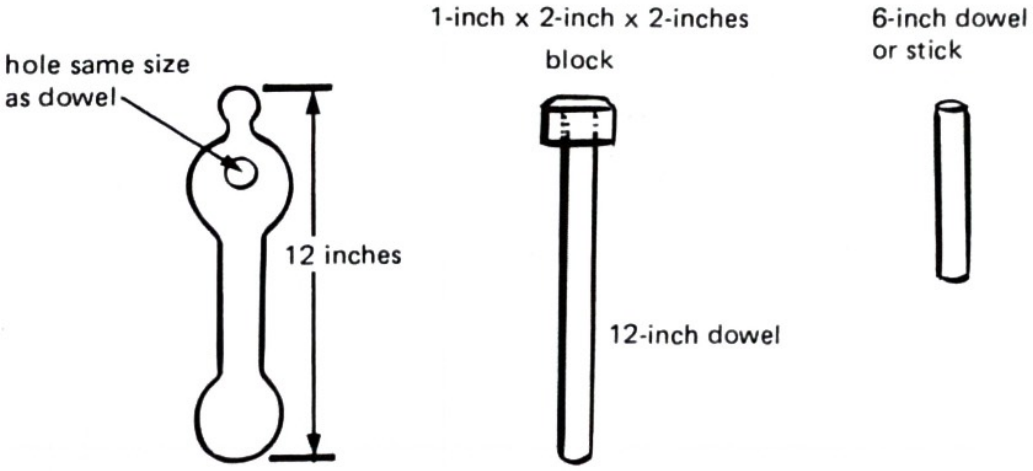
The rope will go into shape itself and remain there, but the wrench should be used to ensure even twisting and to prevent kinks. The cranks should be turned slowly while the rope is being formed.

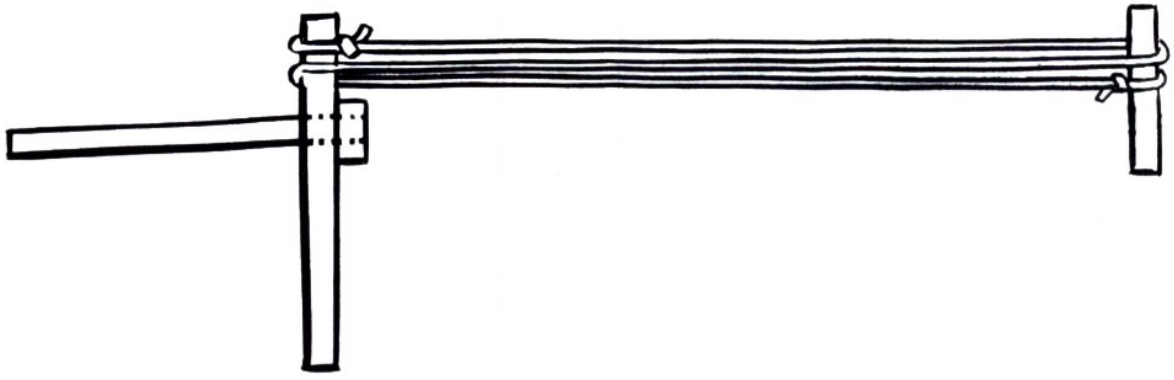
When your rope is complete, take it off the hooks and whip the ends to prevent fraying.



ROPE SPINNER

Tie a loop on each end of a long piece of binder twine or heavy cord. Attach the twine to the spinner as shown in the diagram so that you have three strands. Spin the spinner in a clockwise direction. When the twine is wound tight triple it again. A third person should do this so that the line can be held stretched out, otherwise it will kink badly. Spin the spinner counterclockwise until rope is wound tight. Take rope off the spinner, whip the ends, and it's ready to use.

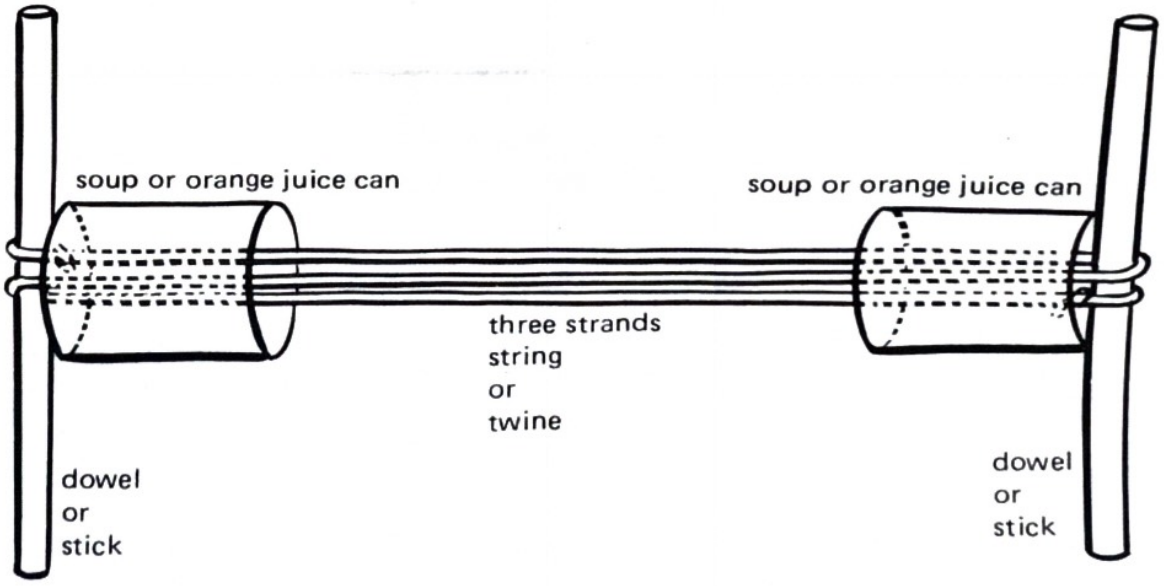




TIN-CAN ROPEMAKER

Tie a loop on each end of a long piece of twine. Slip one stick into each loop. Triple the twine as shown in the diagram to make three strands. Place two soup or orange juice cans (with top and bottom cut out) as shown in the diagram. Each person holds a can in the left hand and turns the stick clockwise until the twine is wound up tight. Carefully triple the twisted line so that there are three again. To do this, the cans may have to be removed and replaced after the line is tripled. This usually requires a third person to help.

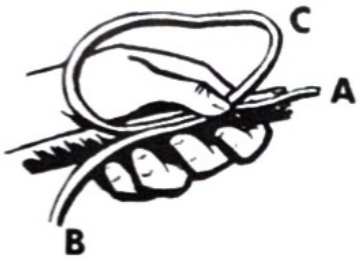
Holding the can in the right hand, each person turns the stick counterclockwise until the line is wound tight. Then remove sticks and cans and whip the ends of the rope. This is a slow but effective process.



WHIPPING

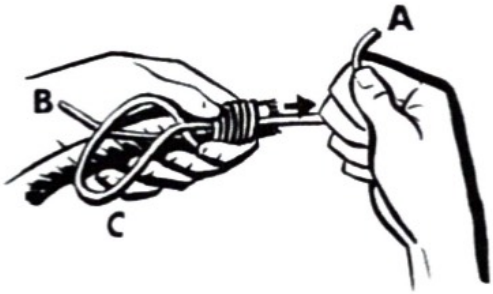
The ends of every rope should be whipped to keep them from unraveling. There are several methods of doing this. For ropes of synthetic fibers like nylon, whipping may be done by applying a hot iron or flame to the ends. This fuses the strands. For a more permanent and satisfactory whipping on a natural-fiber rope, use the back splice. The back splice, however, makes a small lump on the rope end that may be undesirable for some specific uses of rope.

In an emergency, tape may be used for temproary whipping, or an overhand knot can be tied in the end.



You can use any twine for American whipping, although waxed sail twine or electrician's twine is best. Begin by laying a loop of the twine on the end of the rope.

End **A** should be fairly short. Now turn the loop **C** over the end **A** and take several turns around the end of the rope, spiraling away from the end and drawing each turn tight.

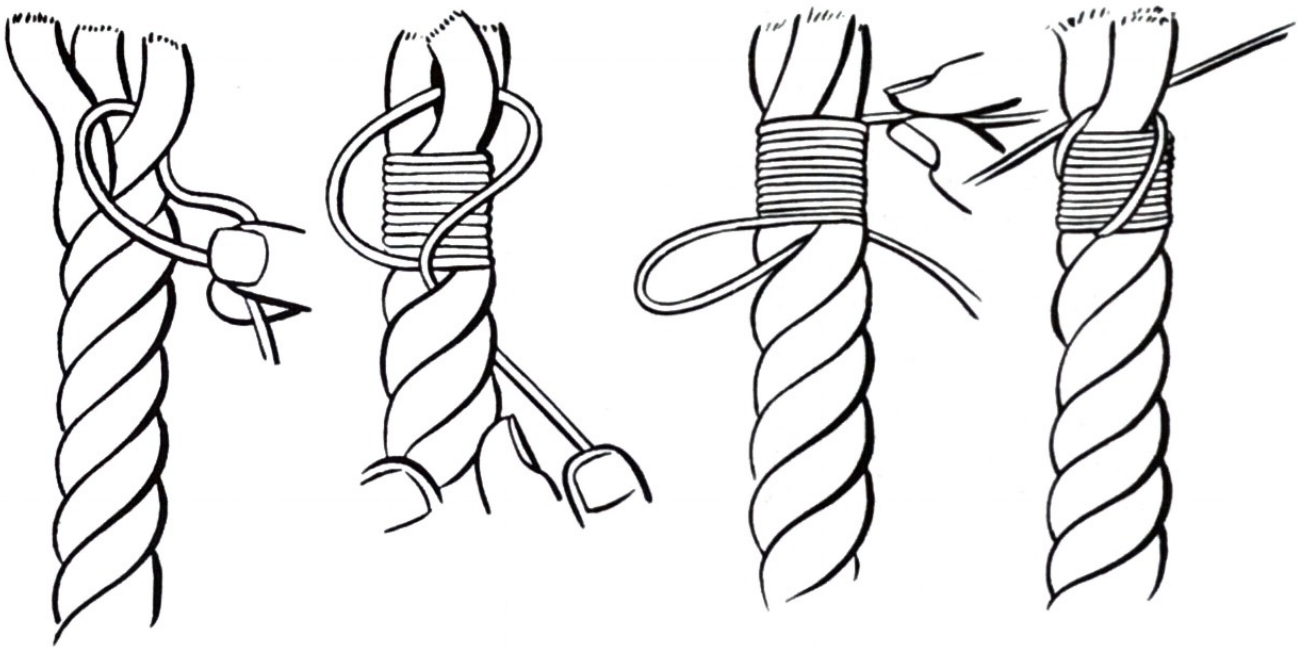


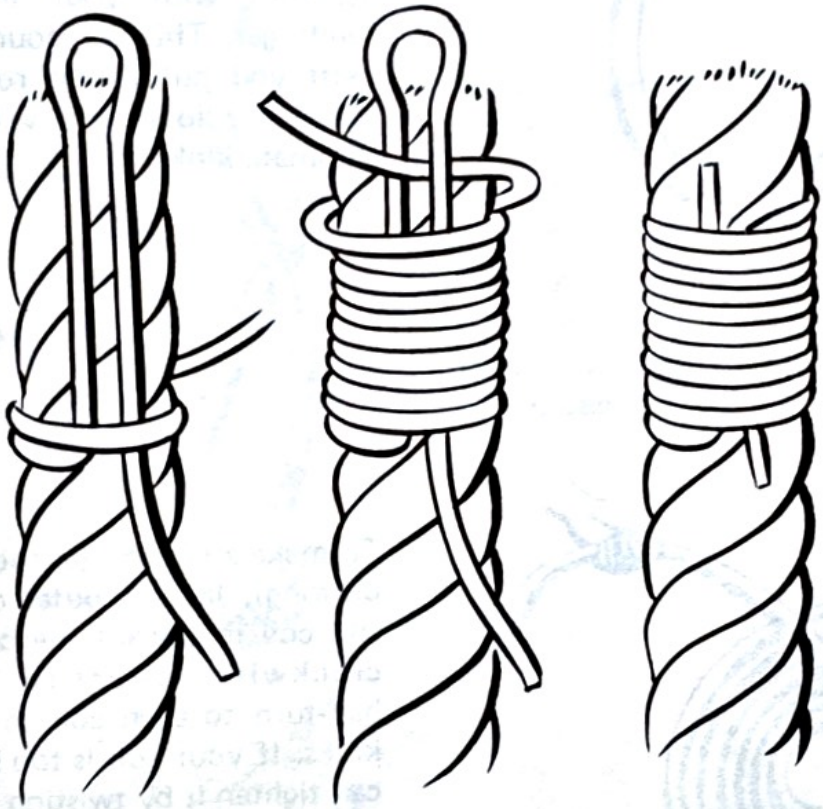
When the whipping is as wide as the diameter of the rope, pull on end **A** until the loop has disappeared. Trim off ends **A** and **B**.

The result should be a snug whipping like that in the final drawing.

SAILMAKER'S WHIPPING

Unlay the rope 2 inches. Make a bight in a 3-foot length of twine and place it around one of the strands. Re-lay the rope. Wind the twine tightly around the rope end for a sufficient number of turns. Carry the bight originally formed back over the end of the same strand around which it was laid. Pull twine ends tight and tie them with a square knot between the rope ends. Trim ends of twine.



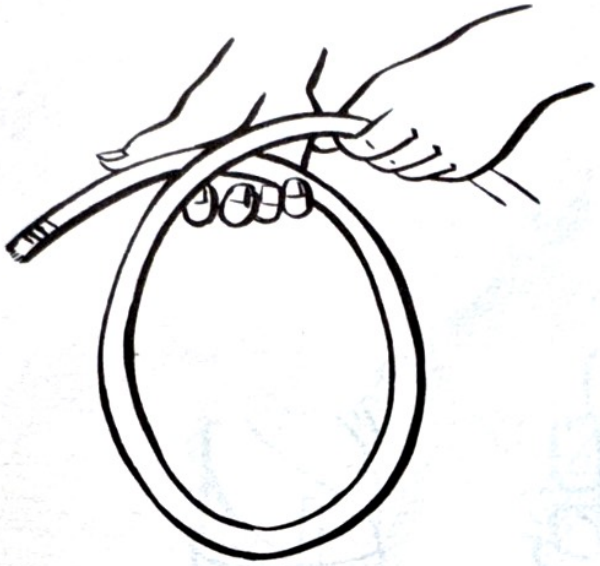


ENGLISH WHIPPING

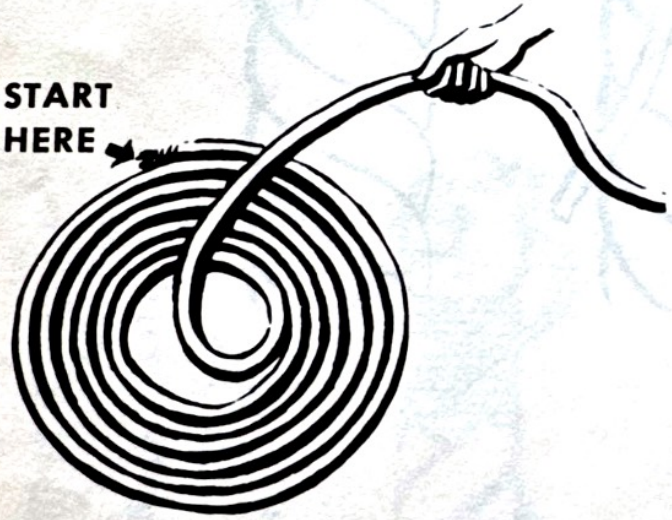
To whip the ends of a rope, use a piece of twine about 6 inches long. Make it into a loop and place it at the end of the rope. A quarter of an inch from the end begin to wrap the twine tightly around the rope. When whipping is as wide as the rope is thick, slip the end through the loop, pull the end of the loop hard and trim off the twine. Then whip other end of rope.

Synthetic-fiber rope (nylon or dacron) can be prevented from unraveling by fusing the ends with a flame or a hot iron. In an emergency, an overhand knot in a line will keep it from unraveling.

COILING ROPE



To coil rope, first shake it out in a straight line so there will be no kinks. Hold the end with one hand. With your other hand pull in enough rope to make a loop about 18 inches long. As you place the loop in your hand, roll the rope a half-turn with your thumb and forefinger. This will counteract the twist you put in the rope as you made the loop and will help to eliminate kinks.



To make a flat coil (as shown in the drawing), lay the **outer** circle first and coil in toward the center in a clockwise direction. Give a half-turn to each coil to eliminate kinks. If your coil is too loose, you can tighten it by twisting the center with the palm of your hand.

To uncoil it, start in the **center.**

CARING FOR ROPE

A good rope is expensive and should not be handled carelessly. Keep it clean and free of mud or grease. If it is damp, do not coil or store it until it is thoroughly dried out. Always keep it in a dry place. It should never be thrown into a corner to tangle and kink. When a job is finished, the rope should be placed where it will be available instantly, if necessary, and should be coiled so that it will pay out smoothly when needed.

BIGHT, LOOP, OVERHAND

Knots are formed by using three simple turns—the bight, loop, and overhand. Even the most complex knot can be figured out if you remember these turns.

The **bight** is formed by laying the end of the rope against the standing part or long end.

Loops, overhand or underhand, are just what their names say.

With these three turns you can make any sort of knot.

Have the three basics—the bight, the loop, and the overhand knot—clear in your mind, and the rest should be easy.

END KNOTS

Knots in this group are most often used to prevent slipping. They may be tied in either the end or standing part of the rope to check it from sliding through a block, hole, or part of another knot. They may be used temporarily to stop fraying when a rope is not whipped.

OVERHAND KNOT

This is one of three basic turns in knotting and also the simplest of the end knots.

FIGURE-EIGHT KNOT

Often used in such places as the end of a string when tying a package with a slipknot or in the end of a rope forming a lariat loop.

STEVEDORE'S KNOT

This is the same as the figure eight, except that it has an extra loop. This makes it larger and more chainlike in appearance.

WALL KNOT

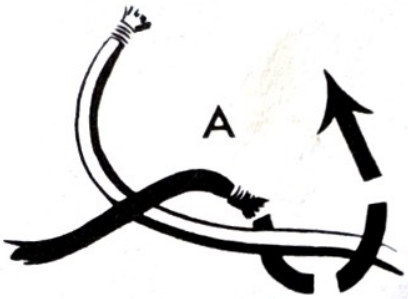
This knot and the one shown are firm, round, semipermanent "stopper" knots tied with the end strands of a rope. Snug it carefully so that strands tighten evenly. You can trim the ends or twist them together again and whip the end.

SINGLE MATTHEW WALKER KNOT

This is the wall knot carried one step farther. Begin it by tying the wall knot, but before snugging, carry each end through the bight ahead of it so that each strand runs under two bights.

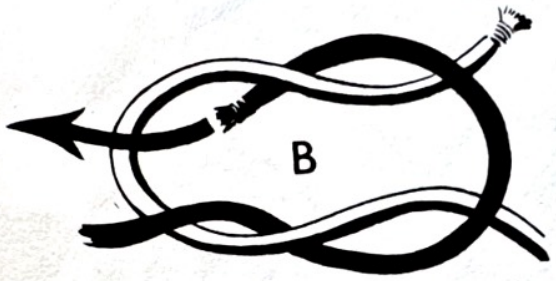
KNOTS FOR JOINING

These knots are used for tying two rope ends together: sometimes the ends of the same rope; sometimes the ends of different ropes.



SQUARE KNOT

A. Put the two rope ends together, left over right, and twist the left one behind and around in front of the right end of the rope.



B. Now put the end in your right hand over the other and twist it behind and down through the bight.

C. Pull both ends to tighten. You can loosen the square knot easily by either pushing the ends toward the knot or by "upsetting" the knot by pulling back on one end and pulling the other through the loops.

2x12=24
2x10

SURGEON'S KNOT

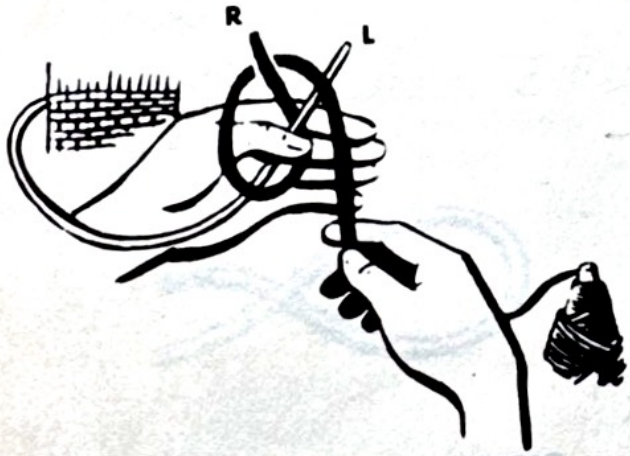
The surgeon's knot is a square knot with an extra twist in the first "left over right." The purpose of the extra twist is to give added friction to hold until the second crossing is made. Surgeons find it useful while performing operations.

2x16=32
2x12

SHEET BEND

The sheet bend is the most important knot for joining two rope ends, especially if the ropes are of different sizes. Sailors named it in the days of sailing ships when they would "bend" (tie) the "sheets" (ropes in the rigging of a ship).

Begin with a bight in the larger rope. Then weave the end of the smaller rope up through the eye, around the bight, and back under itself. Snug it carefully before applying any strain to the knot.



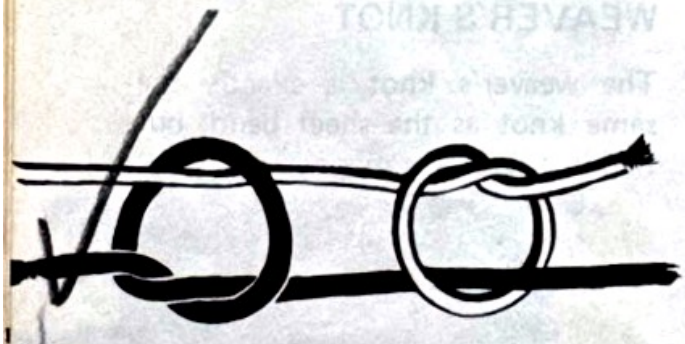
WEAVER'S KNOT

The weaver's knot is exactly the same knot as the sheet bend, but tied in a different manner.

SLIPPERY SHEET BEND

The slippery sheet bend is simply an ordinary sheet bend with a bight left in the smaller rope. This bight makes it "slippery" because it can be untied quickly, merely by a tug on the free end of the rope. It is a valuable knot for use when you expect to tie and untie it often.

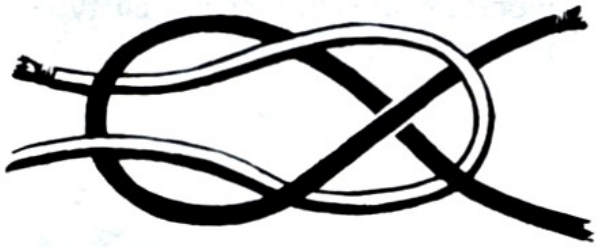
FISHERMAN'S KNOT



The fisherman's knot is used for joining two fine lines such as fishing leaders. It is simply two overhand knots, one holding the right-hand line and the other the left-hand line. Pull each of the two overhand knots taut separately. Then make the whole knot taut so that the two overhand knots come together by pulling on the standing parts of each line.

SINGLE CARRICK BEND

The single and double carrick bends are among the strongest of knots, but they require that both ends be seized onto their standing parts. To make the single carrick bend, begin by making a bight in the left-hand rope, then weave the right-hand rope through it as shown. Finish by seizing the ends of both ropes.

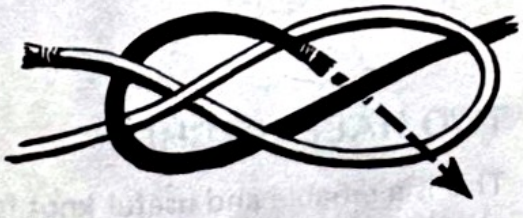


2 × 18 = 36

2 × 14 = 28

DOUBLE CARRICK BEND

This is the same as the single, except that you begin with an underhand loop in the left-hand rope instead of a bight. The result is that there are two crossovers instead of only one as in the single carrick bend. These knots are mainly used on large hawsers for towing ships.



2 × 20 = 40

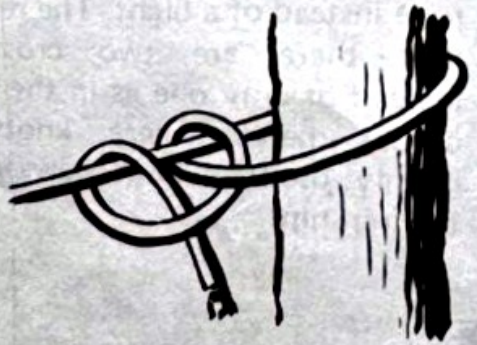
2 × 16 = 32

TYING ROPES TO OBJECTS

Knots that are used for attaching ropes to things like poles or rings are called hitches. They are important in camping and all types of pioneering work.

HALF HITCH

The half hitch is the start of a number of other hitches and is useful all by itself as a temporary attaching knot. It will hold against a steady pull on the standing part, especially if a stopper knot like the stevedore's knot or figure eight is put in the end.

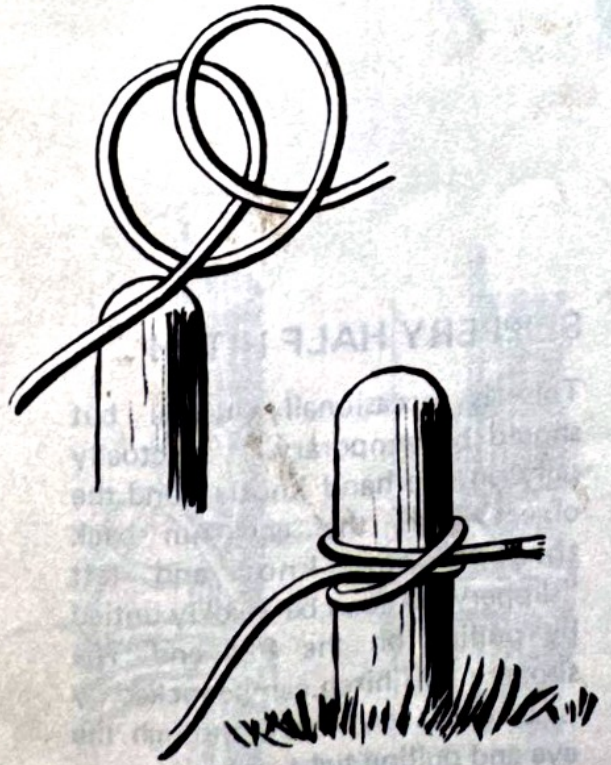


TWO HALF HITCHES

This is a reliable and useful knot for attaching a rope to a pole or boat mooring. As its name suggests, it is two half hitches, one after the other. To finish, push them together and snug them by pulling on the standing part.

TIMBER HITCH

This is an important hitch, especially for dragging a heavy object like a log. It will hold firmly so long as there is a steady pull; slacking and jerking may loosen it. The timber hitch is also useful in pioneering when two timbers are "sprung" together. When it is used for dragging, a simple hitch should be added near the front end of the object to guide it.

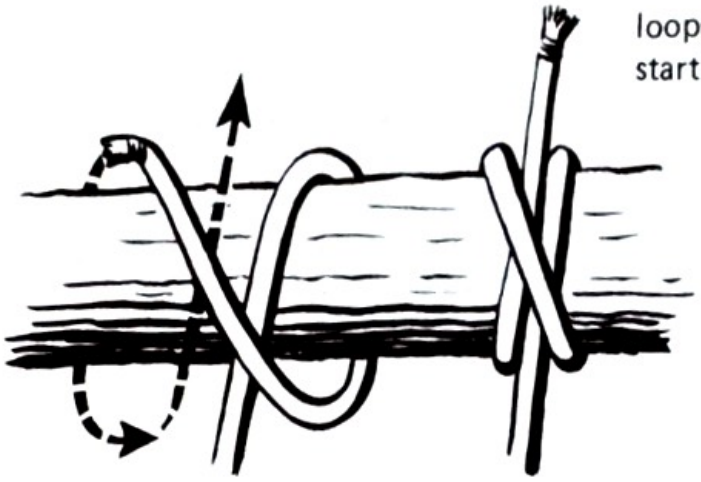


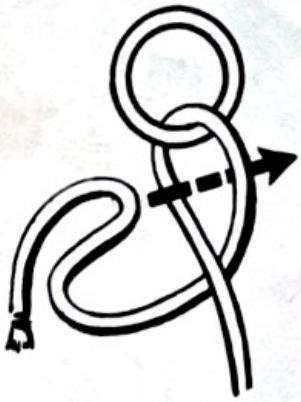
CLOVE HITCH

This is one of the most widely used knots. Because it passes around an object in only one direction, it puts very little strain on the rope fibers. Tying it over an object that is open at one end is done by dropping one overhand and one underhand loop over the post and drawing them togehter.

CLOVE HITCH OVER BAR

This is the same knot as the clove hitch, but this method of tying it must be used if the bar is closed at both ends or it's too high to toss loops over. This hitch is used in starting and finishing most lashings.

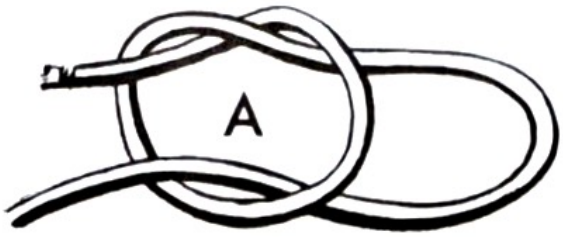




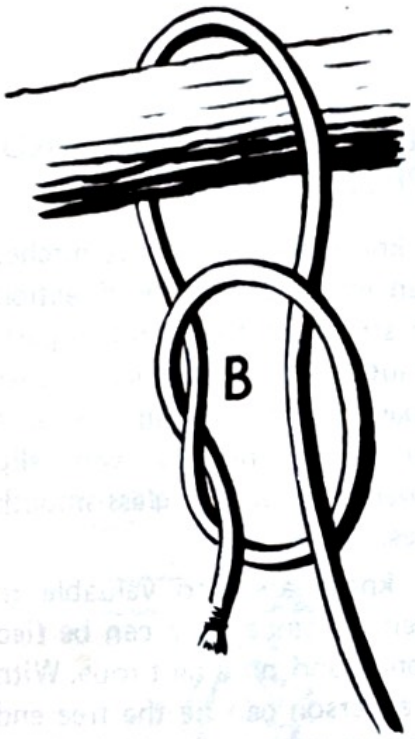
SLIPPERY HALF HITCH

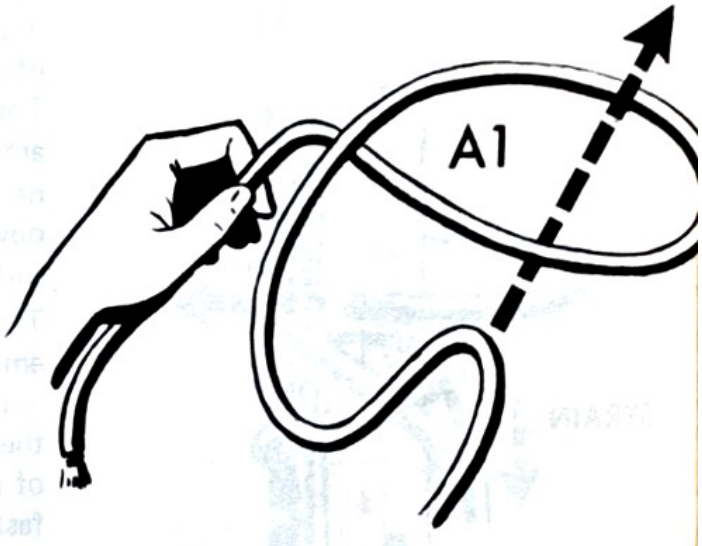
This is occasionally useful but should be temporary. It is actually only an overhand knot around the object with the end run back through the knot and left "slippery." It can be quickly untied by pulling on the free end. The slippery half hitch can be locked by passing the end back through the eye and pulling tight.

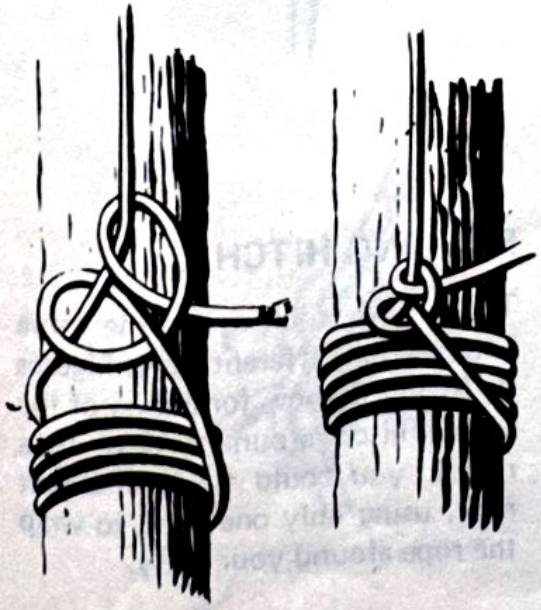
SLIPKNOT



This knot is not as satisfactory as two half hitches because, unless strain is put on it, it may slide, especially on a vertical object like a post. Basically, it is an overhand knot around the standing part as shown in figure B. But it holds better if it can be tied using the standing part first as shown in figure A1 and **then** the loop placed over the object. It will be more secure if a stopper knot, like a simple overhand or figure eight, is tied in the end before beginning.

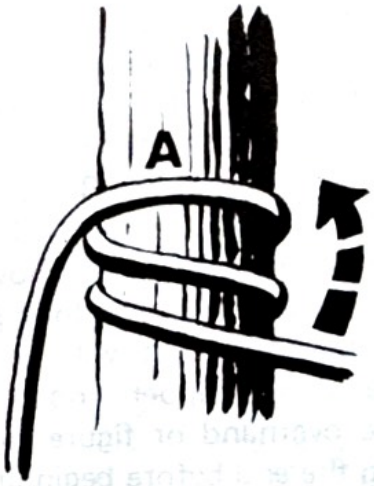






PIPE HITCH

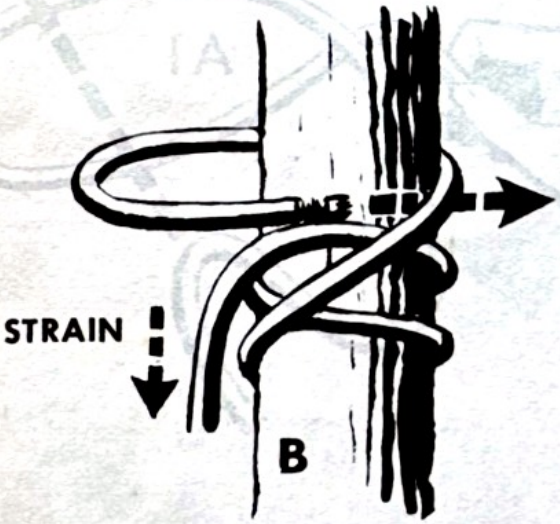
The pipe hitch is useful for lifting a bar or post straight up, as in pulling it out of the ground. To tie it, take four or five turns around the post as shown at far left. Cross the end over and finish with two half hitches around the standing part. An added hitch is usually taken higher on the post with the standing part to keep the post vertical.

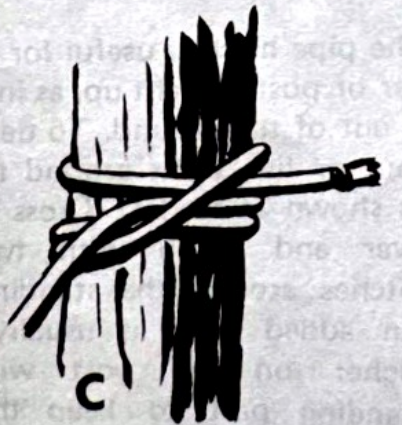


ROLLING, TAUT-LINE, AND STOPPER HITCHES

These knots are really clove hitches with an extra turn in the direction of the strain on the standing part. The taut-line and stopper hitches are particularly useful because neither of the hitches will slip downward even on glass-smooth surfaces.

These knots are also valuable in emergencies since they can be tied with one hand on a taut rope. With them a person can tie the free end of a rescue rope around his body or fasten a second rope to one about to break under strain.



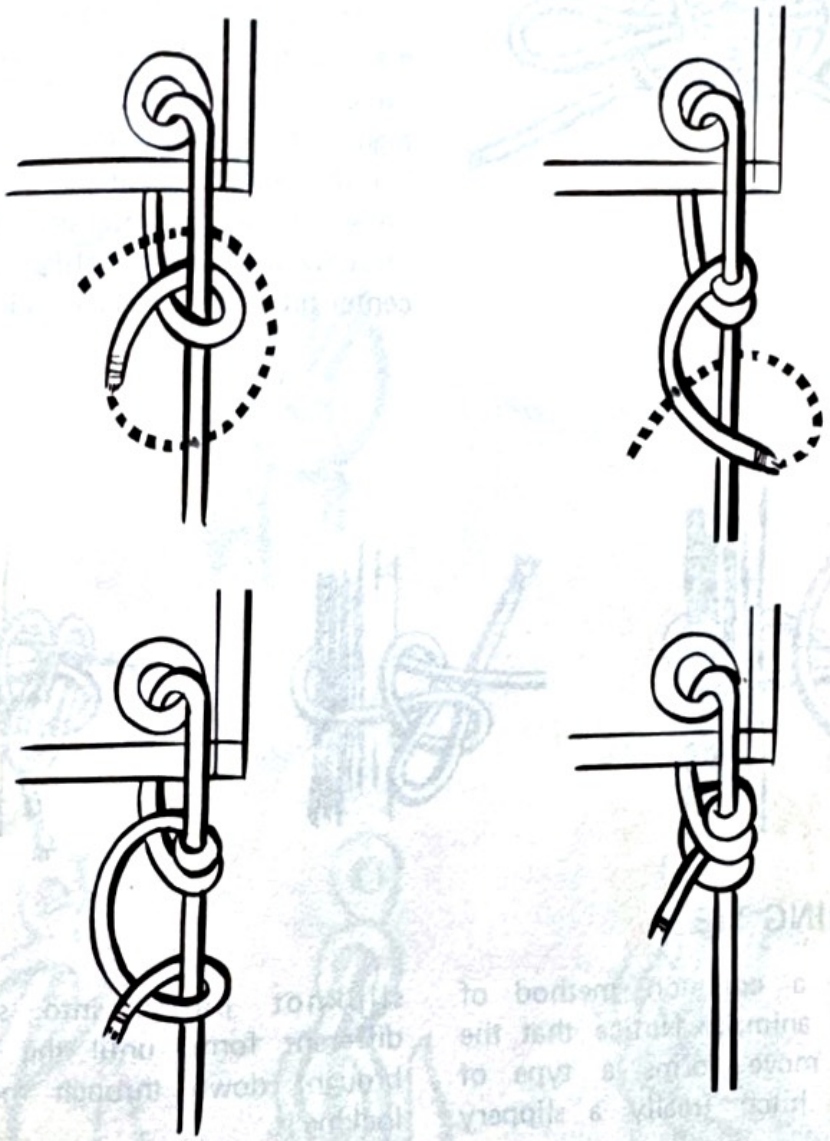


ROLLING HITCH

These two hitches are the same knot used in different ways. Figures A, B, and C show formation of the rolling hitch around a post. In a rescue, you could tie it in a taut rope, using only one hand to wrap the rope around your body.

TAUT-LINE HITCH

Since it will slide only one way, the taut-line hitch is often used on tent ropes.



STOPPER HITCH

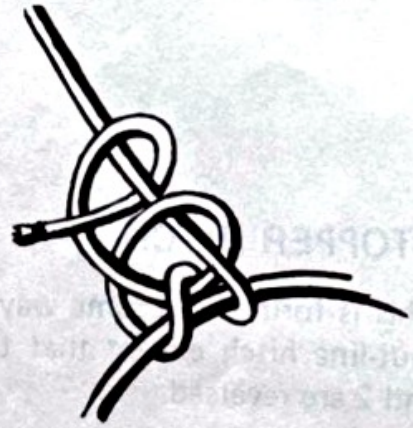
This is formed the same way as the taut-line hitch except that turns 1 and 2 are reversed.

MASTHEAD KNOT

The masthead knot is used principally for decorative purposes today. Originally, its purpose was to place a strap around a temporary masthead to which straps could be made fast. This knot is started with three overlapping hitches. The inner bights of the two outer hitches are led in regular sequence over and under to the opposite sides of the knot, while the upper bight of the center hitch is merely extended.

HITCHING TIE

This is a common method of hitching animals. Notice that the second move forms a type of slippery hitch (really a slippery slipknot pulled into slightly different form) until the end is brought down through the eye, locking it.



ANCHOR BEND

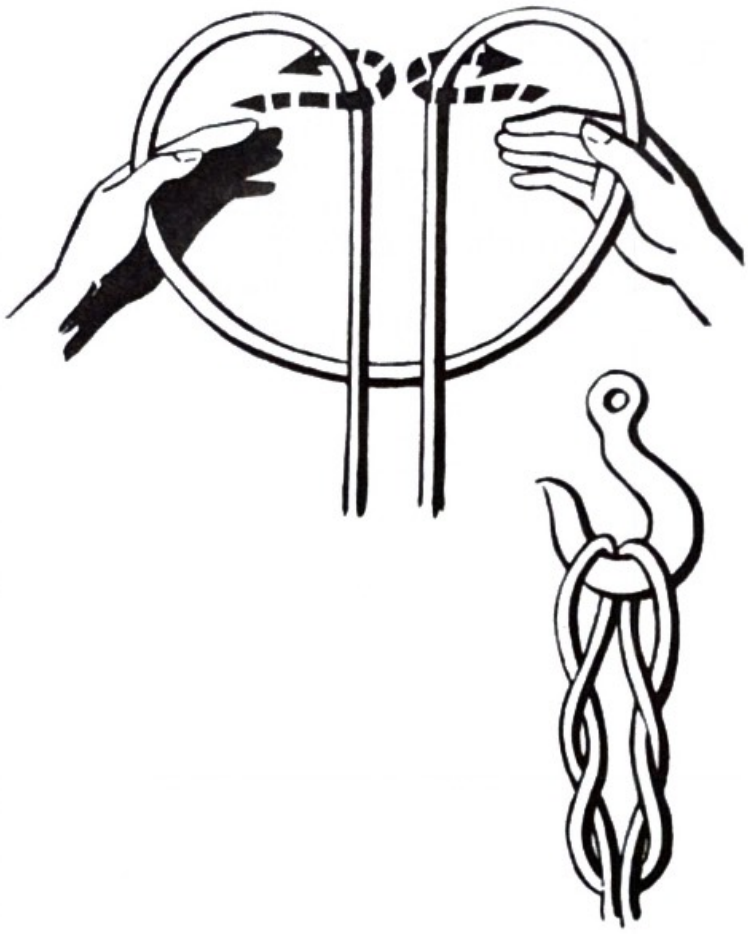
This hitch, which is also called the fisherman's bend, is one of the strongest hitches. Begin by taking two turns around the post or ring. Then bring the end over the standing part and through the loop. Finish as in two half hitches.

SINGLE BLACKWALL

This is a simple half hitch over a hook. It will hold only when subjected to a constant strain. A stopper knot in the end will make it a little more secure, but human life should never be entrusted to it.

DOUBLE BLACKWALL

This hitch is somewhat safer than the single blackwall, but it, too, should be considered temporary. For a stronger, more permanent tie over a hook, use the bowline.

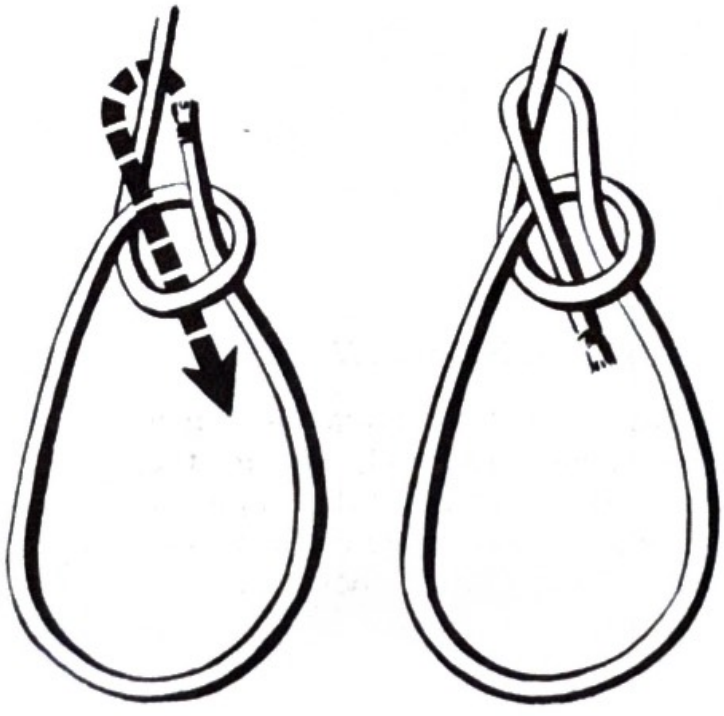


CAT'S-PAW

The cat's-paw is a better way to attach a rope to a hook than either of the blackwalls. It will not slip and needs no constant strain to hold. Form two loops as shown and turn them inward one or two complete turns. Hang these "eyes" over the hook or other object.

KNOTS FOR LOOPS

These knots are used to hold loops—either permanent or "running" like a cowboy's lariat. The bowline and its variations are important for rescue work and on board ship where they have scores of uses.



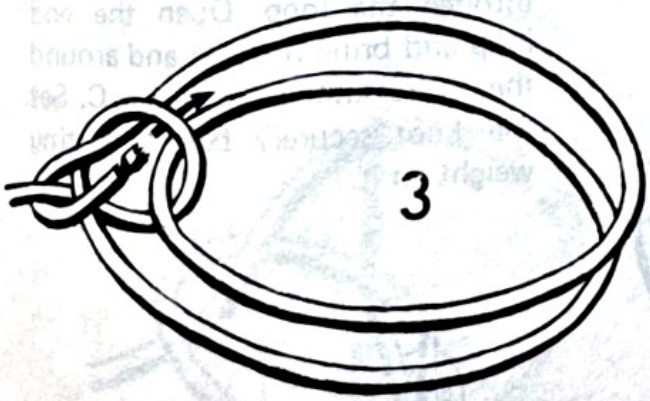
BOWLINE

The bowline has been called the king of knots. It will never slip or jam if properly made and, thus, is excellent for tying around a person in a rescue. Begin by forming an overhand loop in the standing part. Then take the free end up through the eye, around the standing part, and back where it came from.

FRENCH BOWLINE

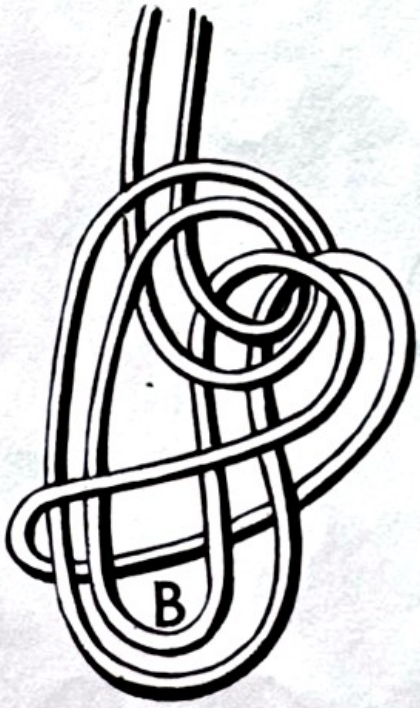
This is a double bowline because it provides **two** nonslip loops (which can be of different sizes). With it a person can sit in one loop and have the second loop as a back support, leaving his hands free. It is excellent for rescue work or for seamen working over the side of a ship. Begin by making an overhand loop as in the regular bowline. But then pass the end through the "eye" **twice** before bringing it back around the standing part and through the original eye.

The bottom drawing shows details of the final knot.



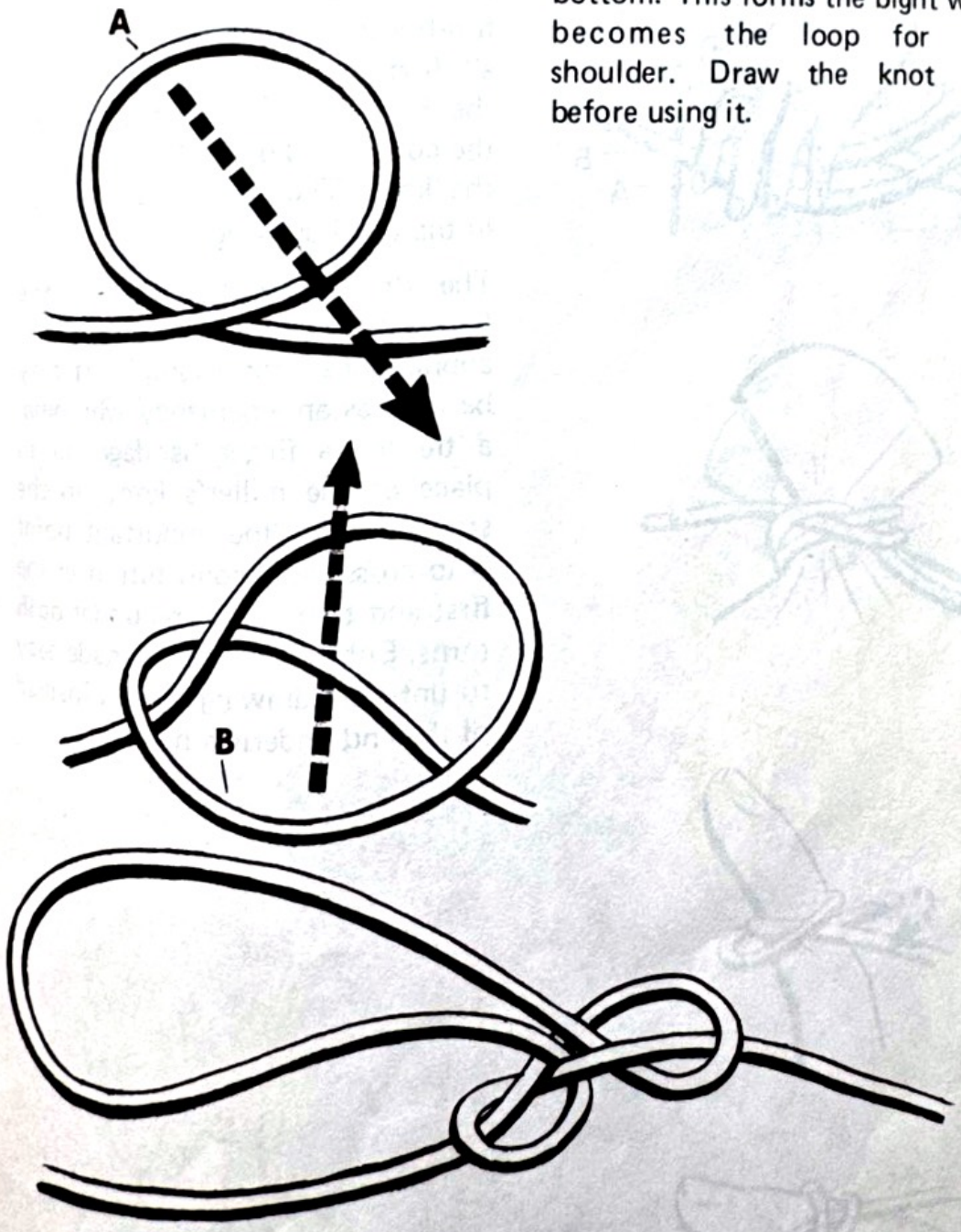
BOWLINE ON A BIGHT

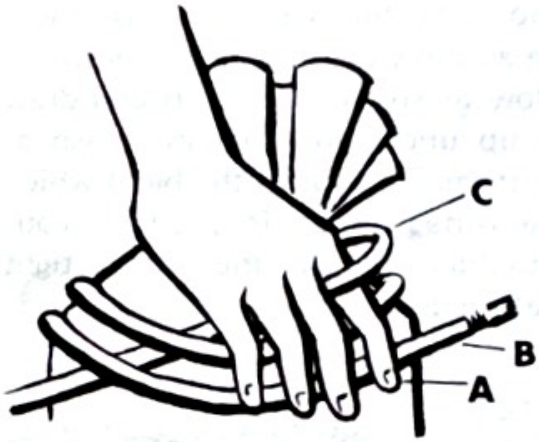
Like the French bowline, the bowline on a bight forms two loops, but they must be of the same size. Start by making a good-size bight and an overhand loop as shown in figure A, bring the end up through the loop. Open the end loop and bring it down and around the entire knot as in figure C. Set the knot securely before putting weight on it.



MAN-HARNESS KNOT

The principal use of this knot is to make a loop in the middle of a rope that is being used for hauling. A man can then use the loop as a harness over his shoulder to add power. Form an underhand loop as shown at top. Grasp the loop at **A** and lay it over the part of rope shown by the arrow. The result will be as shown in the middle drawing. Now grasp the rope at **B** and draw it up under and over as shown at bottom. This forms the bight which becomes the loop for your shoulder. Draw the knot tight before using it.





OTHER USEFUL KNOTS

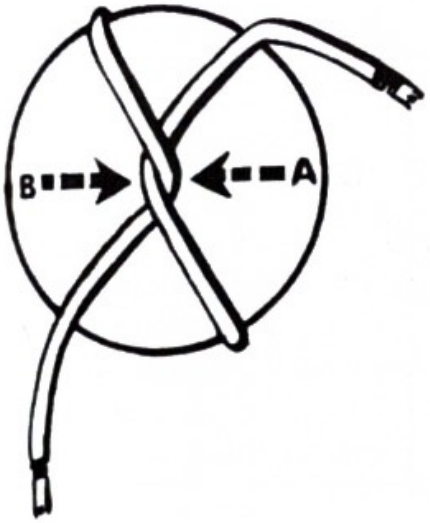
MILLER'S KNOT AND STRANGLE KNOT

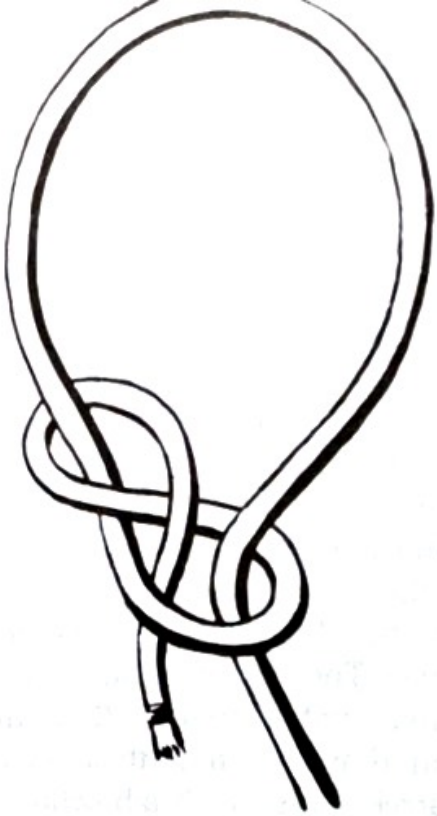
These two knots are close relatives of the clove hitch and are used in tying sacks with heavy string or cord. The top three drawings show the miller's knot. Note that the first turn around the sack leads over the forefinger and the others pass under all fingers. In the middle drawing, the forefinger **A** is about to draw the cord end **B** under **C** to complete the knot. The final result is shown in the third drawing.

The strangle knot, shown in the two bottom drawings, has many applications. For example, it may be used as an emergency whipping, a tie for a finger bandage, or in place of the miller's knot. In the strangle knot, the important point is to cross the second turn over the first and to pull the end under **both** turns. Either knot can be made easy to untie by drawing a bight instead of the end underneath.

BARREL SLING

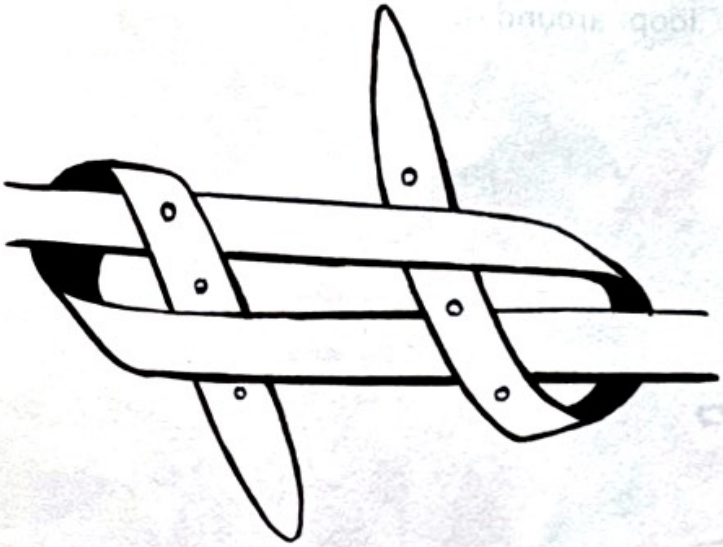
To make a sling for a barrel or other heavy object, lay a length of rope on the ground. Place the barrel on it at a distance from one end about two-and-a-half times its height. Bring the rope ends over the top and form an overhand crossing. Now grasp the rope with one hand at **A** and the other at **B** (middle drawing) and pull in opposite directions. Carry the halves down over the sides of the barrel, as shown by the arrows in the top drawing. The result should be a turn like that shown at **C** in the bottom drawing on both sides of the barrel. Finish with a bowline as shown at bottom. If sling is to be used on a slippery object, pass **two** loops around it.





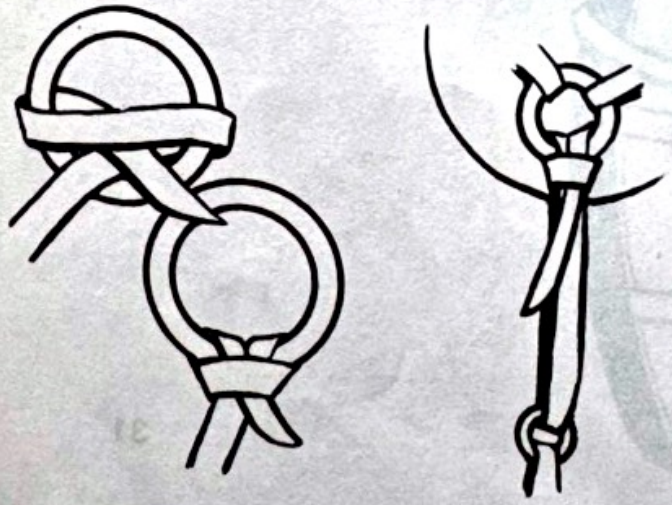
PACKER'S KNOT

The packer's knot is one of the best ways to begin to wrap a package. It is simply a figure-eight knot tied around the standing part. In wrapping packages or bundles, make the first turn by passing the loop of the packer's knot around the package and pulling it tight.



STRAP KNOT

This knot is designed, especially, for tying flat leather straps. It is merely two interlocked loops. They should be pushed together. With a strap knot, leather belts or straps can be linked together to form an emergency rope.

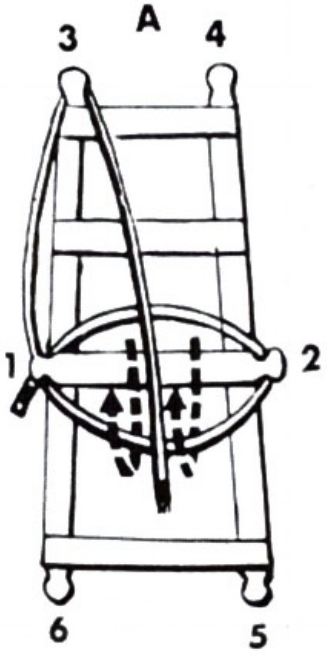


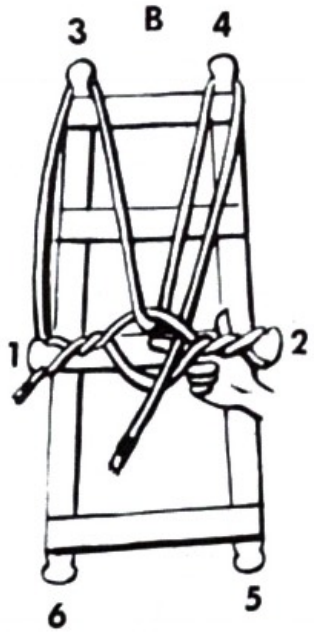
GIRTH HITCH

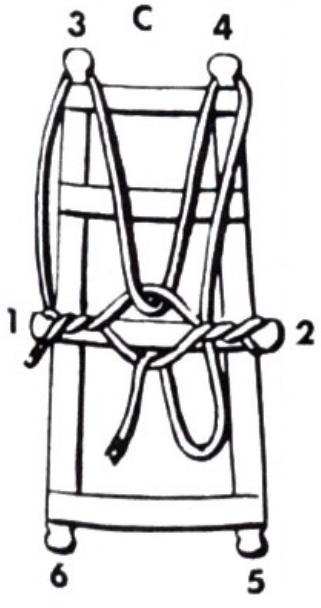
The girth hitch is a handy means of attaching a leather strap or rope to a metal ring and is used in tying the cinch strap of a western saddle.

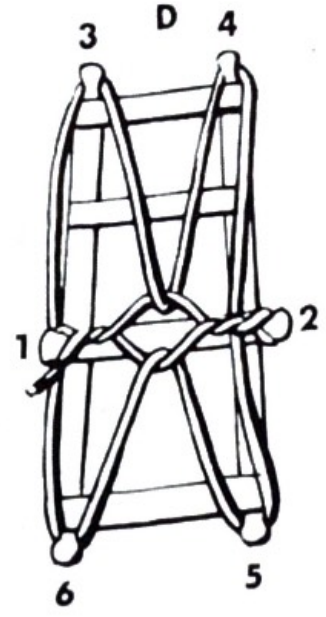
DIAMOND HITCH

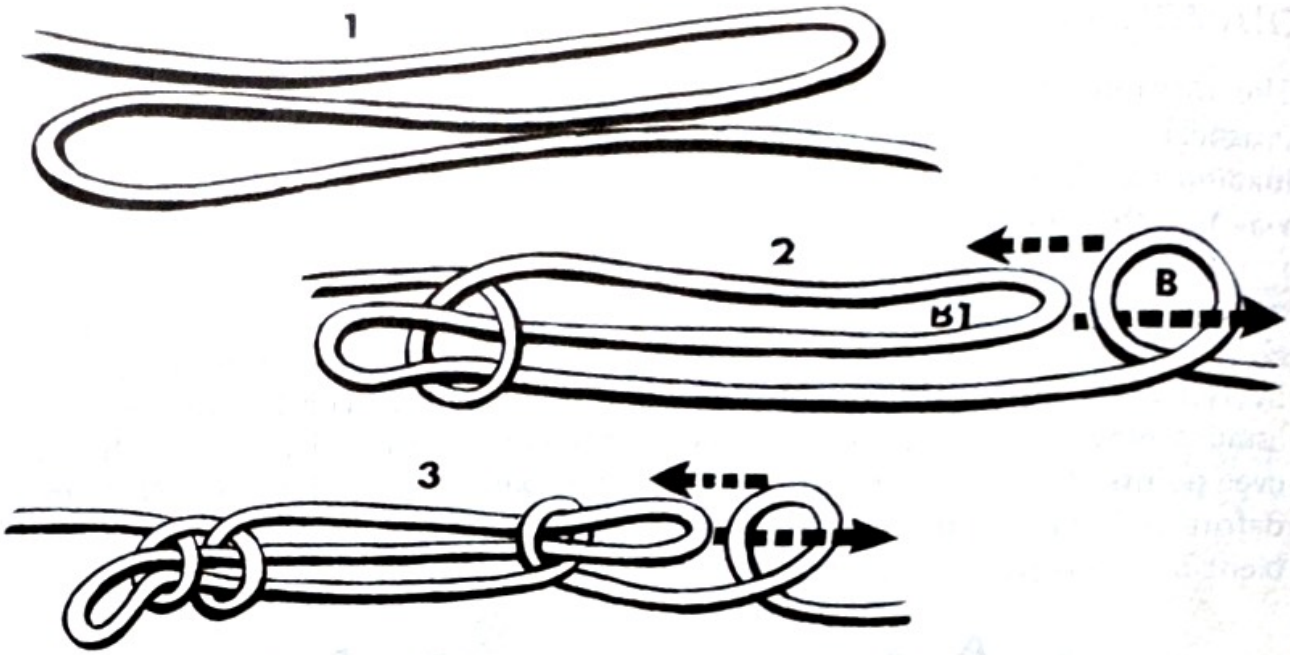
The diamond hitch, long used by prospectors, traders, and trappers in loading packhorses, is also a handy way to lash your pack to a six-point frame. Its advantage is that a pull on any section of the line makes every other section tighter. Begin by tying one rope end at point 1, using a clove hitch. Loop the rope over points 2 and 3 as shown in **A**. Before pulling the line through the bight between points 1 and 2, twist the two center strands two or three times as shown. Then loop the rope over the other points in numerical order as shown. When the hitch is nearly complete, pull the rope to tighten all sides and tie it at point 1 (over the starting hitch) with a hitch or knot. The bottom drawing shows the diamond hitch completed around a pack. Note the "diamond" in the center.





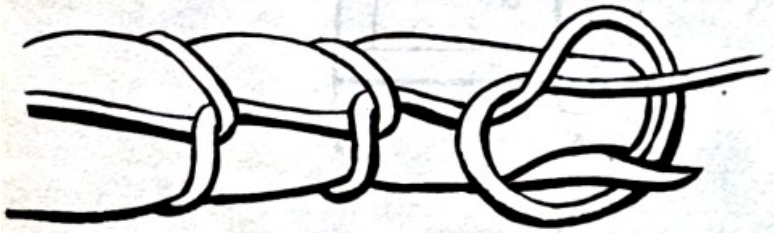






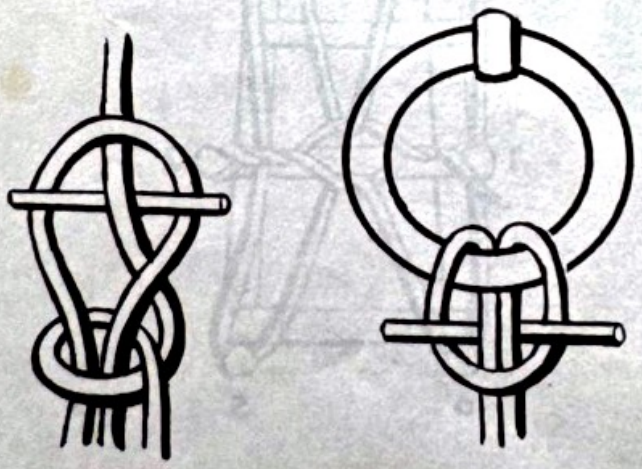
SHEEPSHANK

This knot is used occasionally to shorten a rope that is fastened at both ends. Take up the slack as shown in figure 1. Make an underhand loop as shown at **B** in figure 2 and slide it over the **B1** bight and pull tight. Do the same to the other end to complete the knot. The sheepshank is only a temporary knot as it stands. But it can be made more permanent by adding a second half hitch to each end as shown in figure 3.



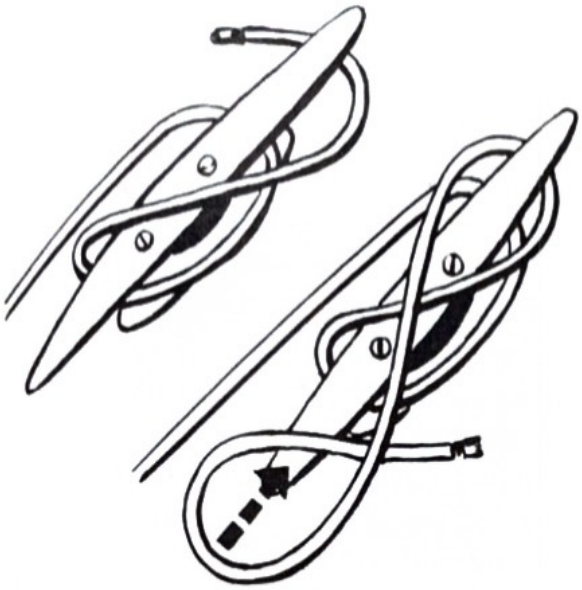
MARLING

This is a very simple hitch used by seamen to lash hammocks or other gear. It is simply a series of overhand knots. The end of the rope should always come out from **underneath** the hitch.



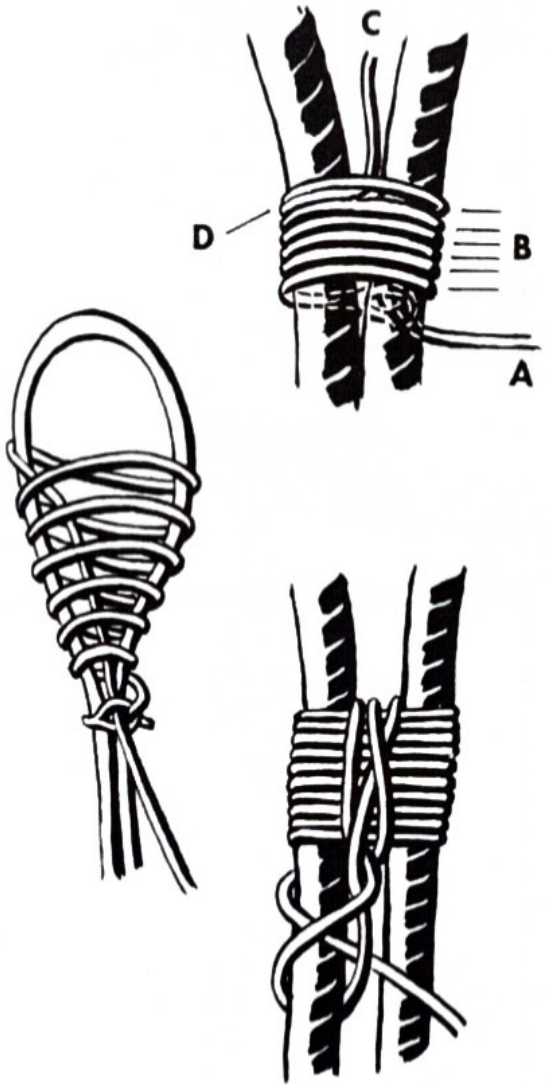
TOGGLES

A toggle is a small piece of wood or metal often used to lock a knot that may have to be loosened quickly or to help it hold better. Two examples are shown. At left is one end of a sheepshank with a toggle inserted to make sure the knot does not slip. At right is a lark's-head with toggle. Removing the toggle releases the hitch.



BELAYING

This is a sailor's term for attaching a rope to a cleat. Begin with a turn as shown in the drawing. Then make one or two figure-eight movements as in the second drawing. Finish with a hitch (underhand loop) pulled snug, unless the rope needs to be loosened quickly.



ROUND SEIZING

A seizing is a small lashing that binds together two ropes or, sometimes, a lashing that holds a rope to a post. Seizings are often used to make a permanent eye in a rope. Cord or heavy twine can be used. To make a round seizing for an eye, form a bight as shown at far left. Use a timber hitch on the end of the cord. Take 8 to 10 turns around both sides of the bight. At the finish of the turns, bring the end down between the loops and up through the eye. Snug up all the loops as shown and leave the end protruding as at **A.** Take a second series of turns, called riders, over the first ones, laying the turns in the grooves as shown at **B.** Do not pull them so tight that they separate the first series of turns. Finish the riders with a tuck-under as shown at **D.** This will leave the end as at **C.** Take two or three frapping turns, see bottom drawing, forming a clove hitch. Take the end down onto one of the ropes and fasten with another clove hitch.

RACKING SEIZING

Racking seizing is used to lash together two parallel ropes. Start with a timber hitch in the seizing material and then wrap it around the ropes in a figure-eight pattern as shown in figure 1. Make as many turns as necessary. When this is done, bring the turns together as shown in figure 2. Now begin winding round and round back toward the eye splice, laying the lashing into the spaces between the turns of the first set as indicated by the numbers in figure 2. The seizing may be finished by making the same frapping turns and fastening used for the round seizing. Figure 3 shows the racking seizing in cross-section; the figure-eight turns are shown by the white band and the round turns by the dark band.

FIG. 1

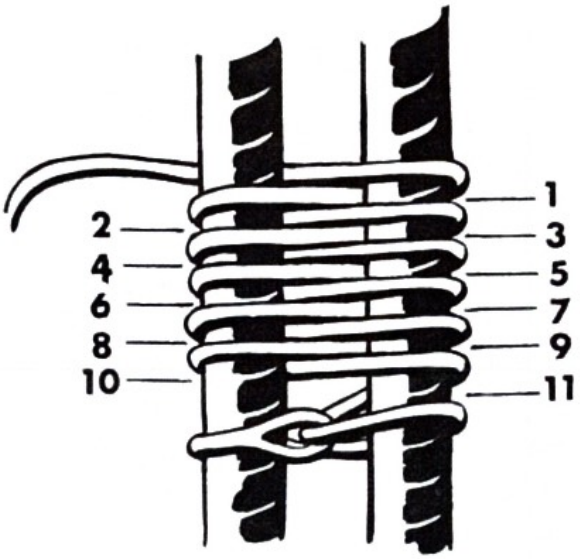
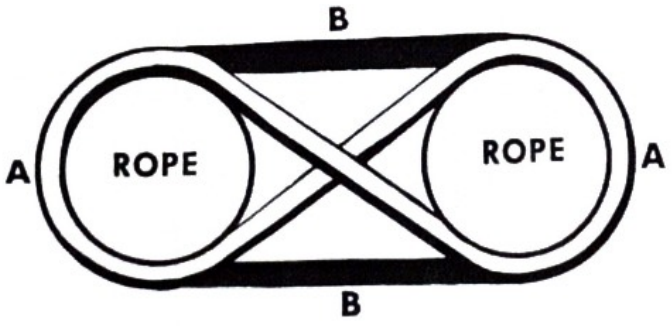
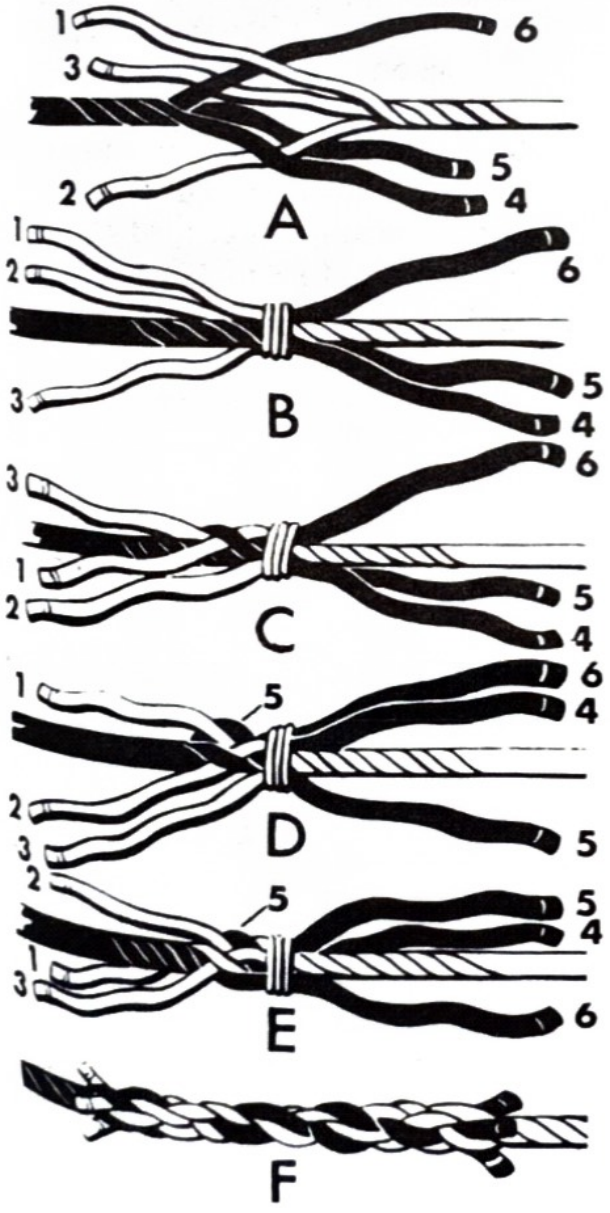


FIG. 2



SPLICES

Splices join ropes permanently and leave the rope almost as strong as it was originally. The strongest of them is the short splice. It makes a small bump in the rope, however, so it will not pass over a block. The long splice is a little less strong, but with it the rope remains the same diameter. The eye splice and back splice have special purposes.



SHORT SPLICE

Begin by unlaying (untwisting) the ropes a few turns. If the rope is large, make temporary whippings on the ends of the strands.

A. Alternate the strands of the two ropes.

B. Tie strands down to prevent more unlaying.

C. Tuck strand **1** over an opposing strand and under the next strand.

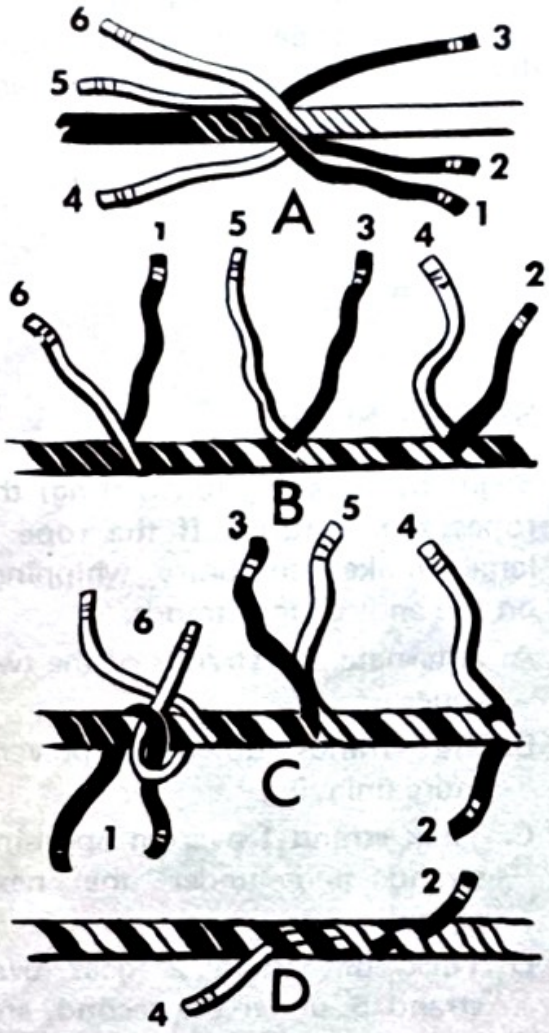
D. Tuck of strand **2** goes over strand **5**, under the second, and out between the second and third.

E. Repeat operation with strands **1** and **3** from same rope end.

F. Remove tie and repeat operation on other rope end. Make two or more tucks for each strand. Then roll the tucks and cut off ends.

You can smooth the splice by rolling it under your foot on the floor.

LONG SPLICE



A. Unlay each rope end about 15 turns. Place the two rope ends together, alternating strands of each end.

B. Using opposite pairs, unlay one end **4** and fill its place with the "partner" strand **2**. Repeat operation exactly with another pair of strands **1** and **6** in opposite direction.

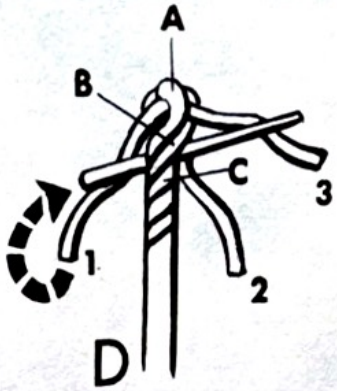
C. Trim the longer strand **4** and tie each pair of opposing strands **2** and **4** with an overhand knot, tucking each strand twice. The tuck goes over one strand, under the second, and out between the second and third. Strands **3** and **5** are simply tied with an overhand knot. Strands **1** and **6** are halved, and opposite strands tied with an overhand before tucking.

D. Roll and pound all tucks into the rope and then clip the individual strand ends.

BACK SPLICE

The back splice is a method of preventing fraying or unraveling in the end of a rope. It is more durable and permanent than whipping.

Begin by unlaying the rope and making a crown knot as shown in drawings A, B, and C. The ends are then tucked as in the short splice, with the same over-and-under movement. See drawings D and E. Finish by trimming the ends and smoothing the splice by rolling it on the floor with your foot.



EYE SPLICE

The eye splice is the strongest type of rope loop. Like the short splice, it is woven "one over, one under." Strands may be loosened for tucking by twisting the rope in the direction opposite the lay.

A. Begin by unlaying the end four or five turns.

B. Tuck strand **2** over strand **c**, under **b**, and then out between strands **a** and **b**.

C. Tuck strand **1** once over strand **b** and under **a**.

D. Turn rope over and tuck strand **3** under strand **c** and over next strand.

E. Tuck each strand in turn over and under for several tucks.

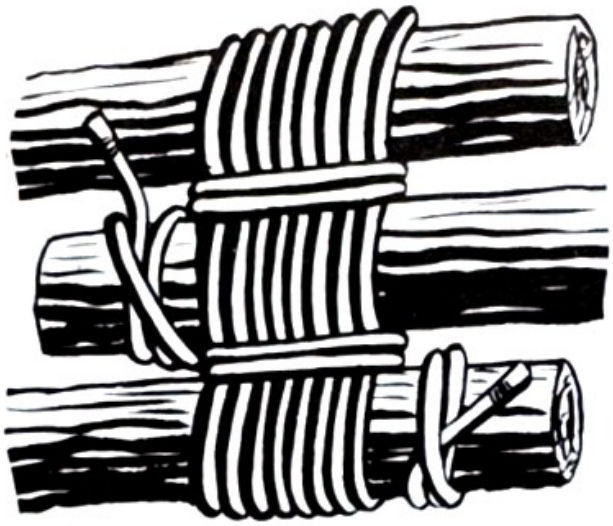
LASHINGS

For lashing or binding together timbers with rope, it's important to use ropes of correct thickness and length. For staves or spars up to 1¼ inches in diameter, use tough twisted or braided line (**not** binder twine.) For spars up to 3 inches in diameter, you need ¼-inch rope. For spars over 3 inches in diameter, use 3/8-inch rope. As to length, figure 1 yard of rope for each inch of the combined diameter of the spars. For example, when you are lashing 3-inch and 4-inch timbers together, you will need 7 yards of rope.

DIAGONAL LASHING

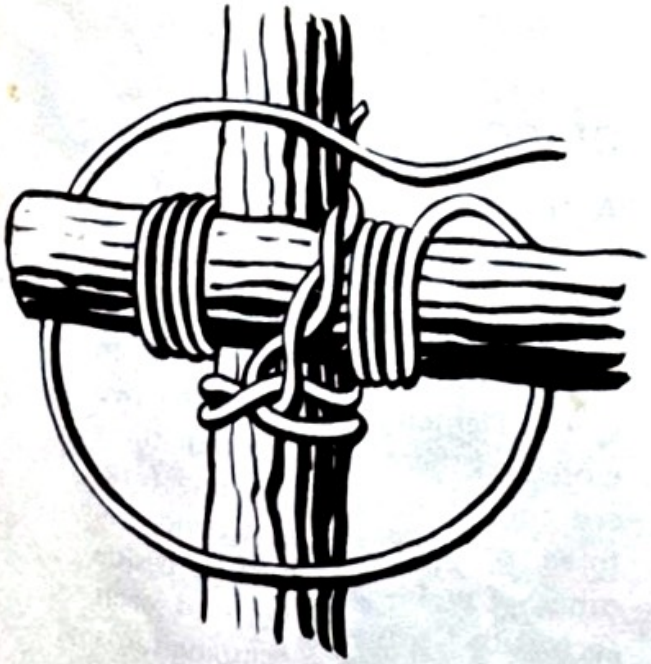
A diagonal lashing is used to "spring" two spars together; that is to lash together two spars that do not touch where they cross. Begin with a timber hitch around both spars. Tighten it to draw the two close together. Three or four turns are then taken around one fork; three or four more, around the other. The turns should be beside each other, not on top of each other. Then take two frapping turns about the lashing at the point where the spars cross, as shown in the lower drawing. Finish with a clove hitch around either spar.

TRIPOD LASHING



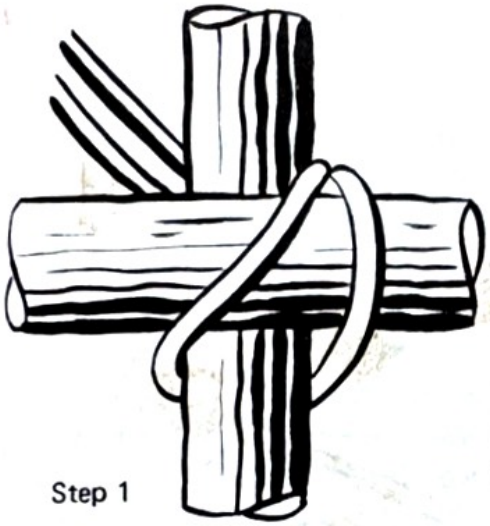
The method for forming a tripod is similar to shear lashing. Begin by laying the three spars on the ground pointing in alternate directions. Make a clove hitch or timber hitch around one of the outside spars. Now take seven or eight loose lashing turns around all three spars and two frapping turns in the spaces between. Finish with a clove hitch on the center spar as shown in the drawing and hoist the tripod into place.

SQUARE LASHING

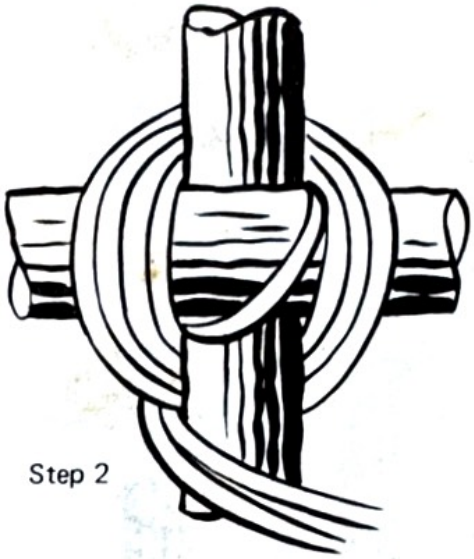


A square lashing is used whenever spars cross at an angle, touching each other where they cross. Start with a clove hitch around the upright, directly below where the crosspiece will be. After tightening it, twist the free rope end and the standing part around each other to hold the loose end. Now wrap the rope behind the upright, down in front of the crosspiece, and around behind the upright. Do this four times, keeping **outside** the previous turns on the crosspiece and **inside** them on the upright. Then make two or three frapping turns between the timbers and strain them tightly. The lashing is then finished with a clove hitch on the crosspiece. Make all turns as tight and secure as possible.

JAPANESE SQUARE LASHING

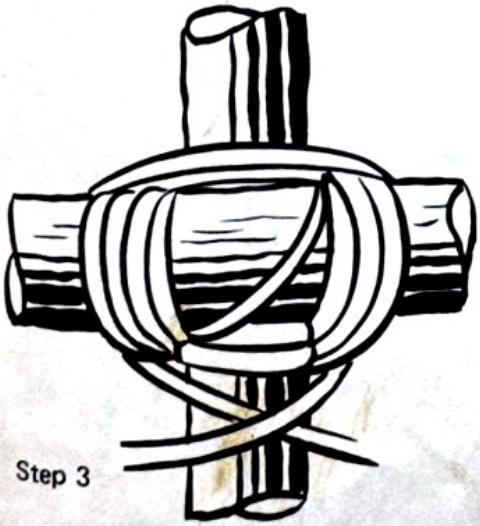


Step 1

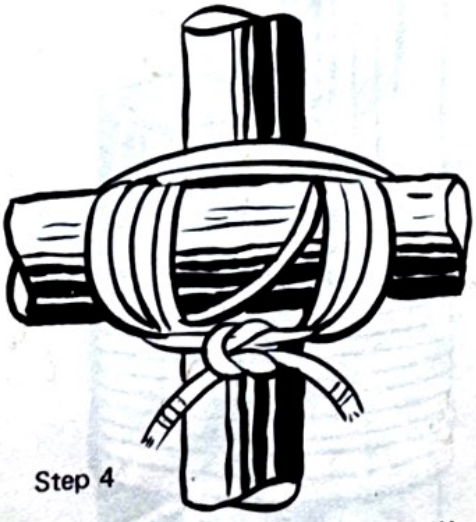


Step 2

You take an ordinary lashing, preferably one about 30 percent longer than you would use for the traditional square lashing, and you use it as a double rope. Begin by passing the bight, which forms automatically if you halve the rope, round the lower spar. Then, with the two parts of the lashing side by side and never overriding, take two complete turns around both spars as for square lashing.



Step 3



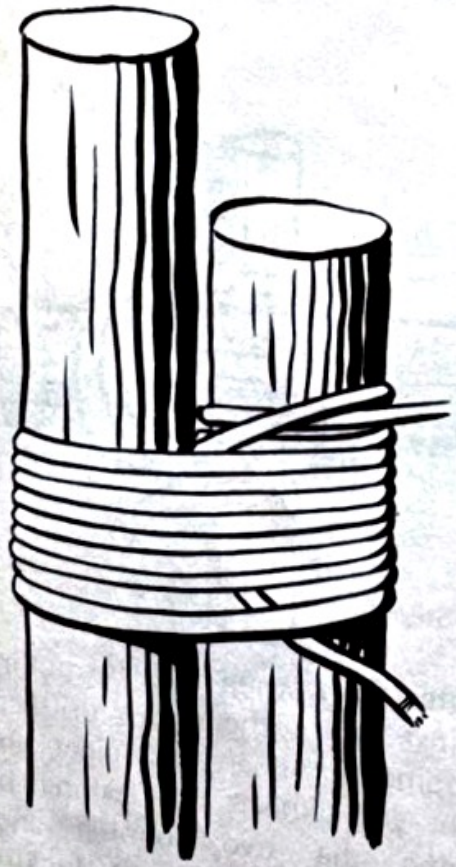
Step 4

Then, take the two parts of the double rope and make frapping turns by taking the two ropes between the spars in opposite directions. One of the great advantages is that it is easier to pull these frapping turns really tight, far tighter than when you are pulling against each other. Two or three frapping turns are sufficient and then you finish the lashing by joining the two running ends together with a reef knot, tucking in the ends, and the job is done.

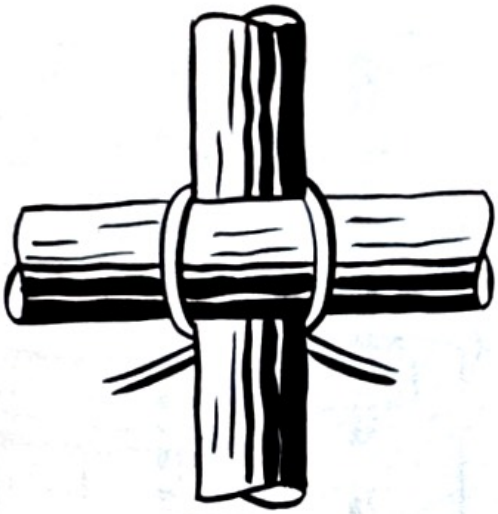
SHEAR LASHING

The shear lashing is used for forming shear legs of timbers with their butt ends spread apart. They are often used in pioneering bridges. Begin by laying the spars parallel to one another. Tie clove hitch around one spar. Then bind the two timbers together by laying seven or eight turns around them, loosely, one turn beside the other. Then make two frapping turns around the lashing between the spars. Fasten the rope end with a clove hitch around the second timber. Now you can open out the two timbers to form your shear legs.

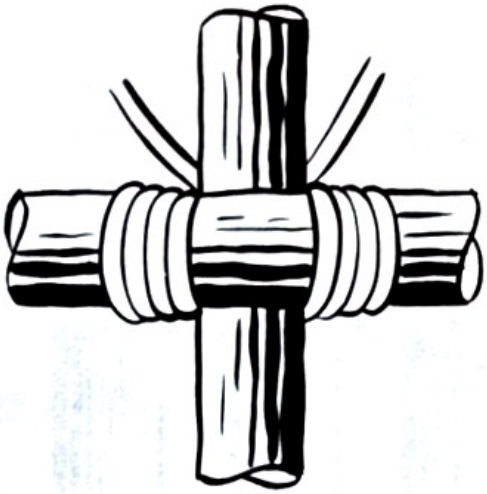
Sometimes shear lashings are used to lash two spars together to keep them parallel (to extend a flagpole, for example). In that case, **do not** use frapping turns.



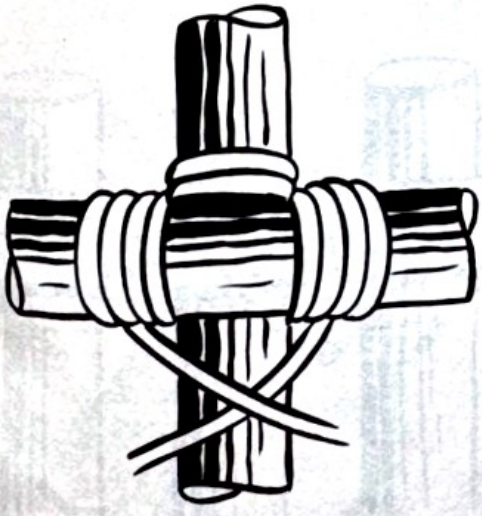
NORWEGIAN SQUARE LASHING



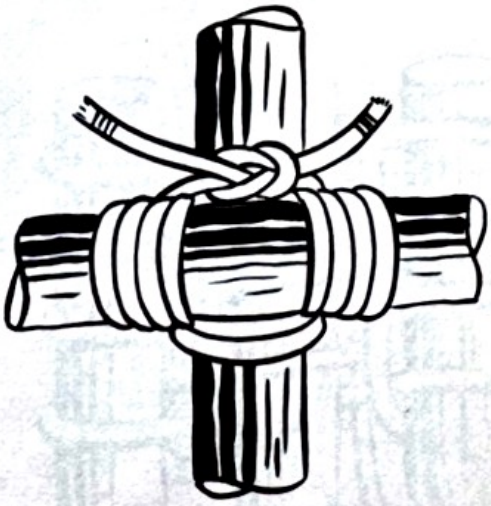
Start at middle of rope.



Make four wrappings.

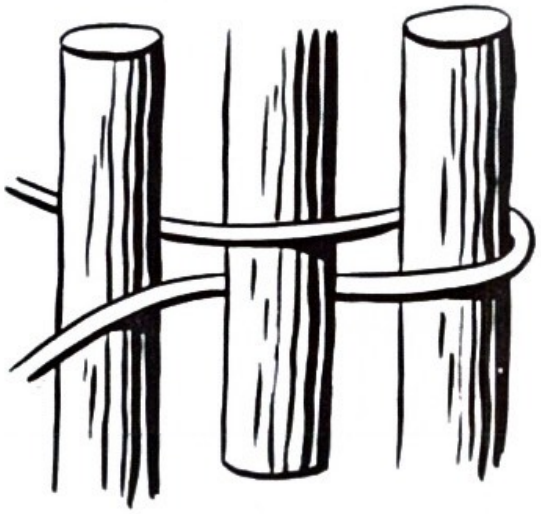


Cross rope ends; make two frappings.

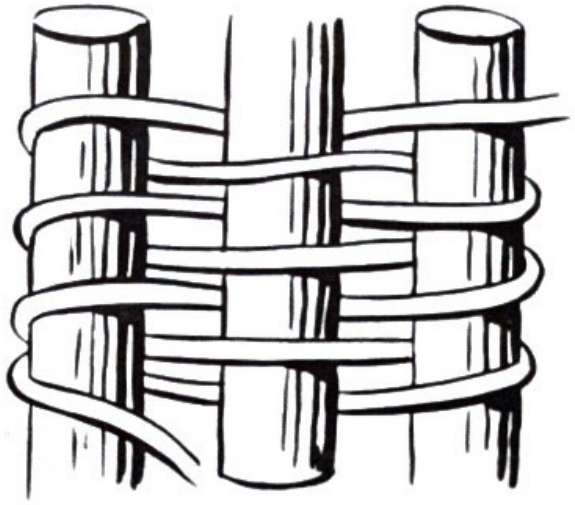


Finish with square knot.

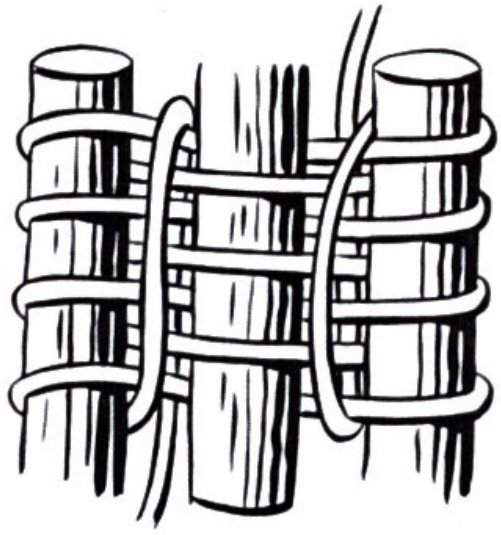
DANISH TRIPOD LASHING FOR LARGE STRUCTURES



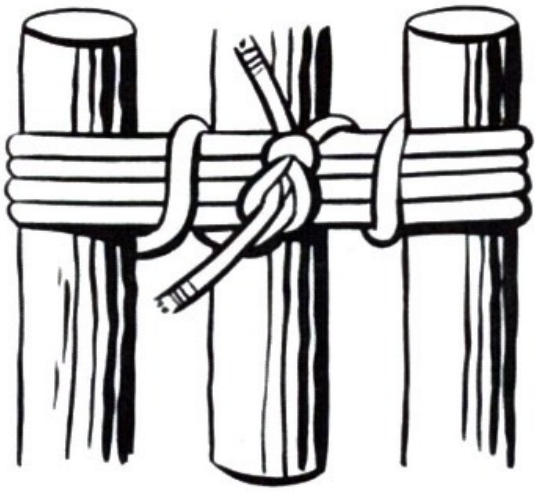
Start at middle of rope.



Weave four to six times with each rope end.



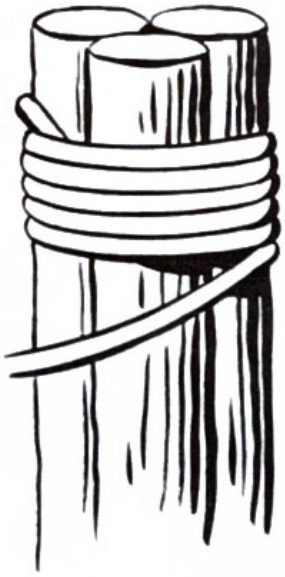
Tighten with one or two frapping turns.



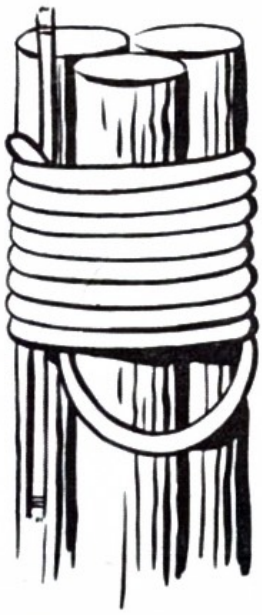
Finish with square knot;
swing middle spar over.

TRIPOD LASHING FOR LIGHT STRUCTURES

Place rope end in groove between spars.



Wrap rope lightly eight times around spars.



Bring free rope end up in groove.

Finish with square knot. Open tripod.

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